NATURAL GAS NUMBER

L AND GAS URNAL

skeletons we don't try to hide

A scrap pile is something you wouldn't expect a manufacturer to advertise.

It's different at Hughes! We're proud of our rock bit scrap pile!

It shows that our inspectors are alert . . . that faulty bits are discovered before they can cost you valuable drilling time . . . or become expensive failures in the hole.

The cones shown above, in various stages of manufacture, were rejected in one of 40 or more separate inspections that started with the bar stock*. Counting all parts, more than 275 inspections—*including the use of electronic inspection equipment*—are made to assure the dependability of the finished bits.

There are 253 inspectors at Hughes. They have an average of ten years' experience.

This is another example of the care that goes into the manufacture of all HUGHES Rock Bits. And another reason why they are accepted as the "Standard of the Industry" throughout the world.

*This valuable high alloy scrap is shipped weekly to mills for remelting.

HUGHES TRI-CONE® ROCK BITS

PRICE 50 CENTS TABLE OF CONTENTS PAGE 81 MAY 12, 1952

HORTON Tanks and Steel Plate Work

at United Gas Pipe Line Co.'s Carthage Plant

Several different types of Horton tanks and steel plate structures—including five Hortonspheres, two absorber towers, five flat-bottom storage tanks, a scrubber designed to operate at 1050 lbs. per sq. in. pressure, a flash drum operating at 500 lbs. per sq. in., and a Watersphere—are in service at the United Gas Pipe Line Company's gasoline plant at Carthage, Texas. These structures help produce and store a wide range of recovered petroleum products—propane, isobutane liquefied petroleum gases, natural gasoline, motor gasoline, naphtha and kerosene.

When you enlarge your present facilities, consider the advantages of using the services of Chicago Bridge & Iron Company . . . years of experience in the petroleum industry . . . many exclusive designs . . . complete plant facilities . . . experienced field crews. We are equipped to fabricate structures from plain carbon steel or corrosion-resistant metals. We have facilities for x-raying and stress-relieving to code requirements and pickling and painting fabricated steel by the Horton Pickling Process. Write our nearest office for estimating figures.

Above: Two 1,600-bbl. Hortonspheres (foreground) operating at 50 lbs. per sq. in. pressure—and three 1,600-bbl. Hortonspheres operating at 150 lbs. per sq. in. pressure.

Right: One 5-ft. 6-in. diam. by 12-ft. scrubber in the foreground—and two 5-ft. in diam. by 48-ft. towers in the background. All operate at 1,050 lbs. per sq. in. pressure.

Below: Four 10,000-bbl. cone roof tanks 45 ft. in diam. by 36 ft. at the United Gas Pipe Line Company's natural gasoline plant at Carthage, Tex.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615-1700 Walnut Street Bldg.
San Francisco, 4.....1544—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. Franklin Roosevelt, 194-S/704-C, Rio de Janeiro, Brazil

Even today you may see here and there a steel plant with a big scrap pile. "Look at all that scrap!" you say. "Why the talk about a scrap shortage?"

Just a minute! The chances are, that big pile is only a few days' supply. For it takes on the average a half ton of scrap to make a ton of steel. To keep the steel mills of the country operating at capacity calls for *95,000 tons of purchased scrap every day.*

That's why it's so urgent to move the millions of tons of forgotten scrap that's snagged up in plants and factories and on farms all over the country. Freeing that dormant scrap to build up the steel mills' scrap piles would mean a far brighter steel supply picture, with more steel for everybody. So make a systematic check of your plant for dormant scrap, and then call in a scrap dealer!

SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW

BETHLEHEM STEEL

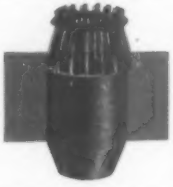
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

More Scrap Today... More Steel Tomorrow

The Oil and Gas Journal, published Mondays, copyright 1952, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

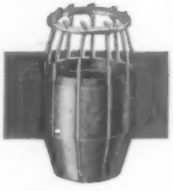
4 types of GUIBERSON SWAB CUPS

TYPE "J" cup lifts heaviest loads from wells of any depth. In the *yellow* box!



TYPE "L" Cup performs superbly on medium and light fluid loads in wells of any depth. Buy the pair in the *blue* box!

TYPE "GW" Cup is a special purpose cup that's tops for running in rough tubing —getting the last cupful of fluid in shallow wells. In the *green* box!



TYPE "K" Tubing Swab cup is a low-priced general purpose swab cup for depths up to 6000 feet. In the *red* box!

LIFT ANY LOAD FROM ANY DEPTH

and do it in record time!

Fast-falling Guiberson Tubing Swabs, with compact, one-piece mandrel and any of *four* types of Guiberson Tubing Swab Cups... give unexcelled performance in lifting *any* load from *any* depth.

All Guiberson cups have flexible lips that insure good wall contact in lifting the load... pass collar gaps smoothly without loss of fluid.

For deep wells, shallow wells, or medium wells... for heavy, medium or light loads... for smooth or rough tubing— Guiberson offers the widest range of cup types and sizes on the market today!

WHATEVER YOUR SWABBING PROBLEM

there's a Guiberson Cup that answers it!

Write today for descriptive swab pamphlet

THE GUIBERSON CORPORATION

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Now you can see the difference between grommet belts and ordinary V belts

B. F. Goodrich grommet V belts last longer, serve better, save money

THE "X-ray" belt, made of transparent material, was developed just to show you the exclusive B. F. Goodrich grommet construction. Now you can look beneath the surface of a V belt, see for yourself what makes B. F. Goodrich grommet V belts last longer, keep running with fewer interruptions, need less attention.

Note the twin grommets — Each of these grommets is like a giant cable except that it's *endless* — a cord loop built up by winding heavy cord on itself. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

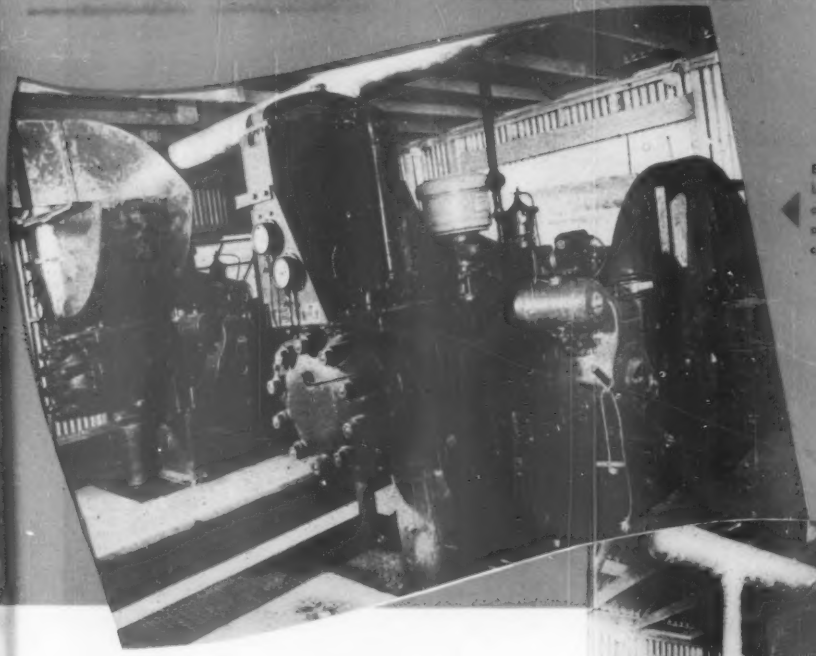
Better grip, less slip — Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. Your local BFG distributor has an "X-ray" demonstrator belt and will be glad to show it to you. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

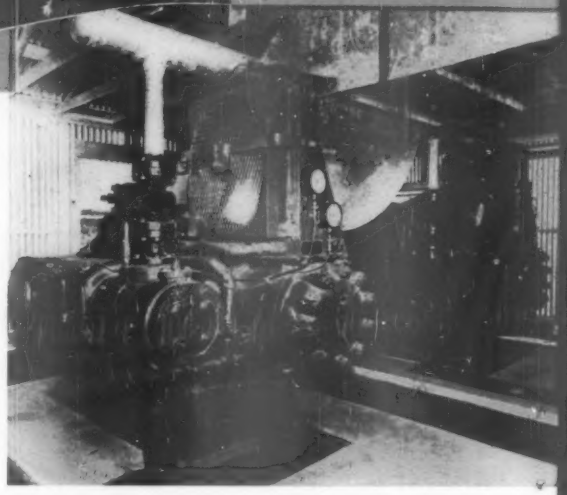
Re-pressuring for 30 wells...

with 2 "Oilwell"-Lorain Direct-Connected Gas Booster Units



Each unit is driven by a Model "A" Lorain Gas Engine with 13" bore and 13" stroke. It operates on gas at 300 rpm to develop 50 hp. under continuous running conditions.

The engine and compressor are both mounted on a cast-iron base and the single-stage compressor with 9-inch stroke is driven direct from the engine crankshaft.



KEWANEE OIL COMPANY, PAMPA, TEXAS, has installed two "Oilwell"-Lorain Direct-Connected units for re-pressuring some 30 producing oil wells.

Each of these units is designed to pump natural gas with an intake pressure of 100 psi. and discharge pressure of 500 psi., and to handle 500,000 cubic feet of gas every 24 hours. At present the units are being operated with intake pressure of 50 to 60 psi. and discharge pressure of 235 psi. and are handling a total volume of 600,000 cubic feet per day.

"Oilwell" is the only supplier of slow speed direct-connected gas booster units of this size in the industry. Your nearest *"Oilwell"* representative will gladly give you complete information about these and the other gas booster units in the "Oilwell" line.

OIL WELL SUPPLY DIVISION
UNITED STATES STEEL COMPANY

Executive Office—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices— CALGARY, CANADA
CASPER, WYOMING . . . COLUMBUS, O.
DALLAS, TEXAS . . . HOUSTON, TEXAS
TULSA, OKLA. . . . LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL

HELPING AMERICA BUILD FASTER

Beechcrafts.. newest kind of ranch and farm "machinery"

Beechcrafts are used to check herds, fences, distant acreage. Records show they've saved many a harvest when equipment parts were needed pronto. And with a Beechcraft, there's no such thing as an "isolated" farm. This Model C35 Beechcraft Bonanza cruises at 175 mph, is right at home on small, rough fields.

You find Beechcrafts in every kind of business, helping America build faster . . . helping speed today's twin jobs of defense *and* consumer goods production. See how a Beechcraft can simplify your travel problem. Call your Beechcraft distributor. Or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

A great combination

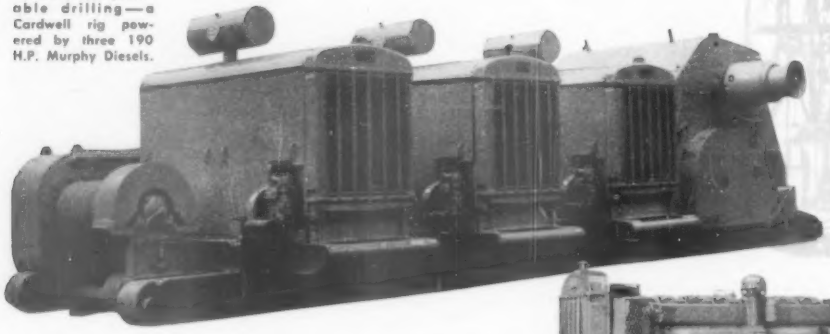
for more profitable drilling

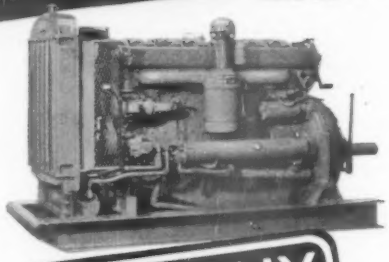
. . . a good rig

and

MURPHY DIESEL POWER

A typical good combination for profitable drilling—a Cardwell rig powered by three 190 H.P. Murphy Diesels.





A good rig or good power alone isn't enough for good drilling but when you hook Murphy Diesels onto a good rig, you have the right combination for really making hole. That's because Murphy Diesel Power is heavy duty power that is immediately responsive. It's economical power, too, enabling you to make more hole per gallon of fuel.

Full details are given in the booklet, *"10 Questions to Ask a Diesel Engine Salesman"*. Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL COMPANY

5305 W. Burnham St., Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma

See Your Murphy Diesel Dealer

LOS ANGELES, CALIFORNIA
Engine Sales & Service
SAN ANTONIO, TEXAS
J. E. Ingram Equipment Co.
EVANSVILLE, INDIANA
Pershing Equipment Co.
AMARILLO, TEXAS
Service & Supply
EDMONTON, ALBERTA, CANADA
Northern Engine & Equip. Co., Ltd.
JACKSON, MICHIGAN
Utility & Industrial Supply
DALLAS & LUBBOCK, TEXAS
Conley-Lott-Nichols Mach. Co.
HOUSTON, TEXAS
Houston Engine & Pump Co., Inc.
MT. VERNON, ILLINOIS
Ed. Meyer Tractor Co.
GREAT BEND, KANSAS
Manufacturers Dist. Co.

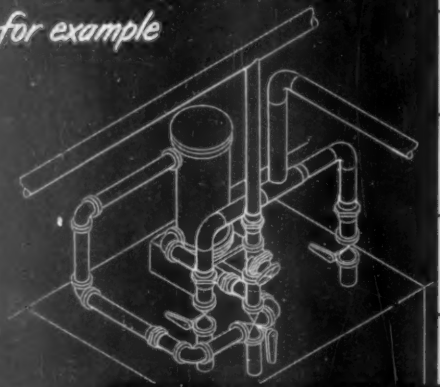
MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

Are Your Valves Behaving This Well?

... on River Water, for example



THE INSTALLATION

Crane Iron Body Diaphragm Valves on hydraulic lines to cylinder operators on ash pit gates; Southwark Station; Philadelphia Electric Company.

VALVE SERVICE RATINGS

SUITABILITY:	Good design for gritty fluid
FEATURES:	Neoprene disc insert resists cutting
MAINTENANCE COST:	Making big savings here
SERVICE LIFE:	Already 6 to 9 times longer than other valves
CORROSION-RESISTANCE:	O.K. No sign of corrosion
PRICE:	Better than many ordinary valves
AVAILABILITY:	Regular number in Crane line

THE HISTORY

Valves were installed in the hydraulic system when the control cocks failed to shut off tight. But like the cocks, conventional valves put in this service didn't stand up. They couldn't handle the abrasive, sandy river water used for hydraulic operators as well as for ash pit sluicing. They leaked badly in 3 to 5 weeks; had to be replaced.

The problem was solved with Crane Iron Body Diaphragm Valves. Installed more than 7 months, there's been no leakage since; no valve trouble of any kind. The Neoprene disc insert and wide, flat seating surfaces in Crane Valves show no effect of abrasion. Their completely sealed bonnet keeps working parts free of grit.

THE VALVE

In Crane Packless Iron Body Diaphragm Valves, the Neoprene diaphragm acts as bonnet seal only; is not subject to crushing and rapid wear. Separate disc with Neoprene insert shuts off flow even should diaphragm fail. Made unlined or with full Neoprene body lining. Well suited for erosive fluids, sludges, slurries; also for many corrosive services. See your Crane Catalog or call your Crane Representative.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

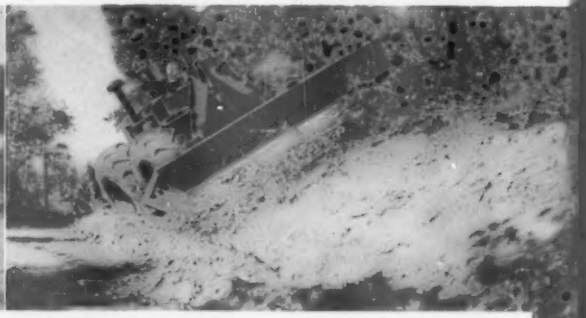
CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

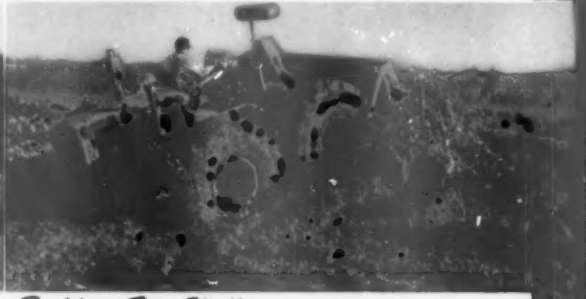
WAITING TIME *is*

Moving Equipment . . . Wherever pulling power is needed, you'll find Tournadozer handy for skidding pumps, generators around drill sites . . . pulling trailers, transporting heavy equipment and supplies. Also pulls Rooter, Scraper, Plows and other drawn units.



Service Road Maintenance . . . Because of its "get-about" ability, Tournadozer utilizes waiting time to keep haul roads free of holes, ruts, bumps . . . spreads surfacing. Here, Angledozer blade attachment is used to slope road shoulder.

Clearing . . . Tournadozer is a big time-saver on clearing operations. Its high speed gets you from job-to-job faster . . . clears more ground quicker. 186 horsepower behind 2½-yd. blade quickly clears roadways, pipeline right-of-ways, construction sites, etc.



Building Fire Walls . . . Tournadozer's speed, power and mobility make it ideal for building fire walls, digging slush pits, etc. Big 21.00 x 25 low-pressure tires give ample flotation and traction for working in soft materials . . . take rig up steep, slippery grades.

Cleaning up Drill Sites . . . For faster leveling and cleaning up of drill and plant sites, you'll find this high-speed Tournadozer gets there fast . . . gets job done in less time, is ready for the next assignment more quickly than other dozers.

Backfilling Pipelines, Culverts . . . Tournadozer is at its best on any shuttle-type dirtmoving . . . has instantaneous speed selection . . . 19 m.p.h. forward and 8 m.p.h. reverse . . . completes dozing cycles about 3 times faster than most crawler dozers.

Tournadozer gives you oil field versatility

Side-Boom Crane

67,000 lb. Electric-Operated Winch

Angledozer Blade

Root Rake

WORKING TIME

with Tournadozer

Have you ever figured how much time is lost with a conventional dozer, either waiting for a flatbed, or crawling from one lease or drill site to the next? Waiting time, slow moves, costly delays can be turned into productive time, more work done, with today's high-speed, rubber-tired C Tournadozer.

This dozer *runs,* instead of crawls . . . travels 19 miles while old-style dozer crawls 4 to 8. What's more, Tournadozer's big 21.00 x 25 low-pressure tires let you travel over concrete, asphalt or macadam, instead of taking round-about, back-country routes. You save travel distance, as well as time . . . get there faster . . . get more work done.

Cuts non-productive time all-around

On the site, the "get-about" ability of the Tournadozer enables you to handle dozens of odd jobs. For example, it can travel ½ mile in less than 2 minutes cross country or over lease roads . . . gets there fast to dig slush pits, skid machinery, build firewalls or haul trailers. In addition, you'll always have good haul roads with one of these fast-stepping dozers on hand to run out at a moment's notice and clear a slide, fill mud-holes, widen shoulders, spread surfacing.

Travels 100′ while crawler shifts

Tournadozer not only gets places in less time . . . it does its work faster. Because of instant speed selection, Tournadozer travels 100′ while crawler shifts gears. 10 seconds saved on each gear shift, add up to a lot of extra production hours in a week's time. And, with 186 h.p. and 4-wheel drive on rubber, Tournadozer is twice as fast with a load. Then, too, Tournadozer backs up for each pass at speeds to 8 m.p.h. . . . cuts deadhead time in half. Find out what modern Tournadozer mobility, extra travel and working speed can do for you. See your LeTourneau Distributor today.

Travels, Works Anywhere

. . . over concrete, macadam, plant yards, through town, cross tracks, curbs . . . no waiting for flatbed or truck . . . just hop on and go at 19 m.p.h.

R. G. LeTOURNEAU, INC.
Peoria, Illinois

Tournadozer, Angledozer, Scraper, Trademark Reg. U. S. Pat. Off. D-130-01

Mail today

R. G. LeTOURNEAU, INC., Peoria, Ill.: Please send information on "C" Tournadozer.

☐ Specifications ☐ Price ☐ Delivery ☐ Nearest Distributor

NAME _____ TITLE _____

COMPANY _____ BUSINESS _____

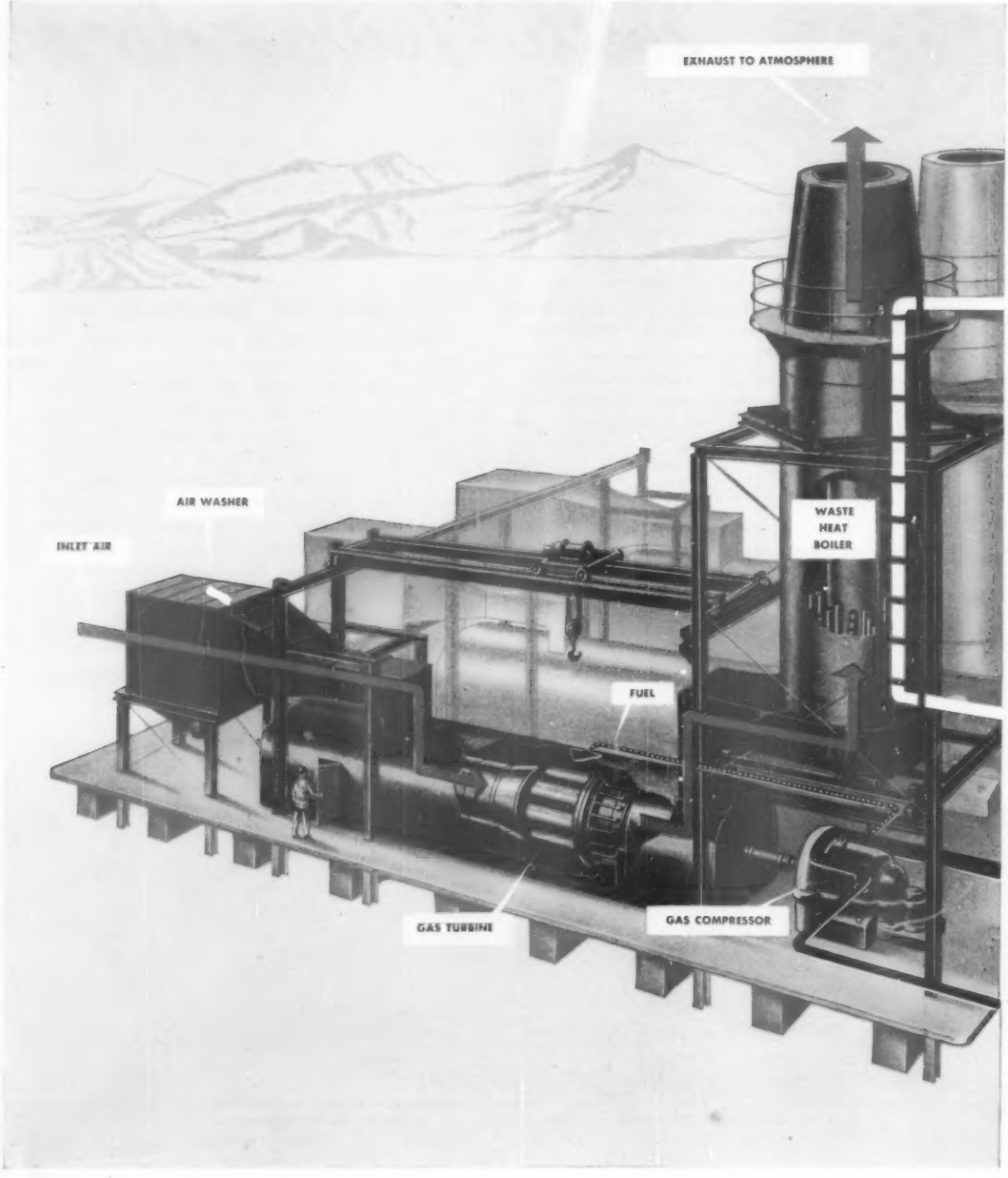
ADDRESS _____ CITY and STATE _____

TYPE of WORK for TOURNADOZER _____

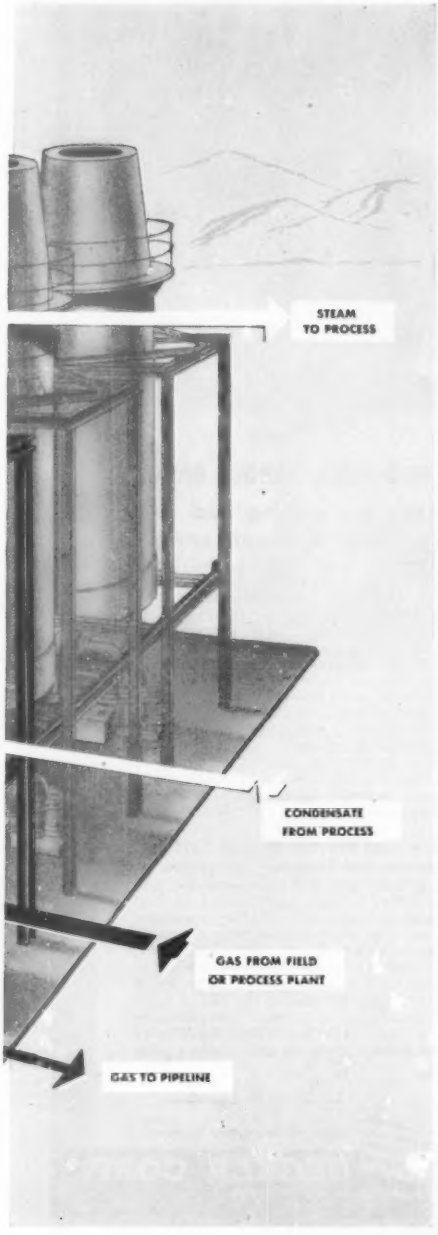
D-150-01

LET

G-E combustion gas turbine



for oil and gas fields



Outdoor unit eliminates building cost, generates low-cost steam, can be easily re-located

Latest suggested applications for General Electric's versatile 5000-hp combustion gas turbine is in field gathering and to increase the flow of gathered gas to processing plants.

There are three immediate advantages. *First*, no building is needed. Both the adjustable-speed gas turbine and the centrifugal compressor are designed for outdoor installation. *Second*, this compact G-E power plant can be moved easily from depleted fields to new fields. (A single rigid bedplate permits handling of the turbine with only a crane.) *Third*, each turbine can also generate as much as 30,000 lbs of 225-psig saturated steam at very little cost.

Cuts total yearly costs

Because less personnel is required than with other types of drives, yearly operating costs of a gas turbine driven centrifugal-compressor are very low. Maintenance costs are exceptionally low, too. The comparatively few moving parts of a gas turbine are all rotating. As a result, maintenance is mostly a matter of periodic inspection. Standard-type auxiliaries and accessories are conveniently located to simplify replacement. In addition, the gas turbine can provide up to 25% more horsepower in winter, when demand is greatest.

Available now

In a large Western gas and electric utility, one G-E combustion gas turbine has already logged-in more than 20,000 hours of operation. Another has been driving a locomotive for over two years. A number of others are being installed for gas pipeline pumping. Now their unique advantages are ready to be supplied to field gathering, natural gasoline and cycling plants, and repressuring projects. Your G-E representative will be glad to discuss your applications with you.

FOR YOUR INFORMATION, a 16-page illustrated booklet gives you the full story about G-E's combustion gas turbine. Call your nearest G-E Sales Office for your free copy of Bulletin GEA-5530, or write *Section 661-31, General Electric Company, Schenectady 5, N. Y.*

Combustion Gas Turbines for the Petroleum Industry

GENERAL ELECTRIC

This is a pretty battered looking instrument, and it should look badly worn, as it

ran 700 days while drilling 60,000 feet of hole . . .

About all that is left of the original tire is the hub, but according to the contracting firm of Hayes & Sprague, THE MARTIN-DECKER HYDRO-MECH TORQUE GAUGE functioned successfully throughout this entire run.

Indicating Gauge can be installed as an individual unit or as an integral part of other Martin-Decker controls.

Minimizes danger of twist-offs . . .

ON DIESEL ENGINES Torque build-up isn't indicated by sound or by the way the engine runs; consequently, torque can build up gradually without warning of impending danger, and before the driller realizes it, a twist-off has occurred. With the Martin-Decker Hydro-Mech, the driller can see excessive torque and then stop to correct it. With the combination of the Martin-Decker Weight Indicator and the Martin-Decker Hydro-Mech Torque Gauge, you can get more work out of drilling operations, because if the torque is not too high, more weight can be added to speed hole making.

ON STEAM RIGS The Martin-Decker Hydro-Mech Torque Gauge, which is mounted on the rotary chain, immediately indicates torque, as there is no lag from the drawworks, transmission and motors.

THE HYDRO-MECH TORQUE GAUGE

Indispensable for milling and cutting jobs and diamond coring

Hayes & Sprague report that the Martin-Decker Hydro-Mech was an indispensable aid in diamond coring below 10,000 feet. Operators everywhere report phenomenal savings in time and equipment when milling, washing over, running diamond core heads, and directional and deep hole drilling with the Martin-Decker Hydro-Mech, because the gauge differentiates between the work required to overcome hole friction and that which is being done by the cutting tool, so that the driller positively knows what his cutting tool is doing, regardless of hole friction, rotational speed, etc.

Substantial increases in rotary chain life are being experienced by Hydro-Mech users, because of the cushioning provided by the synthetic rubber idler wheel and the reduction of chain vibration and whip.

Rotatable Dial Permits Gauge Setting to Indicate Net-Torque-On-Bottom

The gauge is designed with a rotatable dial, permitting the driller to "zero out" friction on drill pipe. This feature is especially valuable in assisting the driller on wells where friction from any cause tends to absorb weight during drilling operations. The torque built up by rotation before weight is applied to the bit is measured by the gauge, but is zeroed off by means of rotating the dial to zero; then as weight is applied, the work being done by the bit at the bottom of the hole is instantly reflected by increased readings above the zero reference point on the gauge.

Write for descriptive literature.

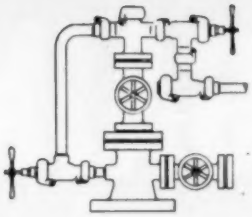
HOME OF THE WEIGHT INDICATOR

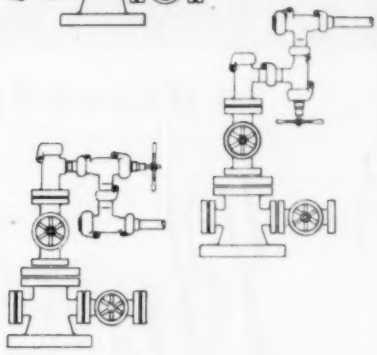
MARTIN DECKER CORP.

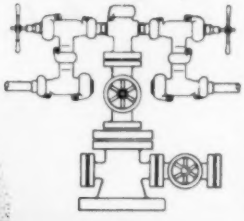
LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: T. J. CULLEN, BAKERSFIELD, CALIFORNIA
MID-CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS
CANADIAN DISTRIBUTOR: REED ROLLER BIT COMPANY OF CANADA, LTD., CALGARY & EDMONTON, ALBERTA

Any way you look at it... by any standard



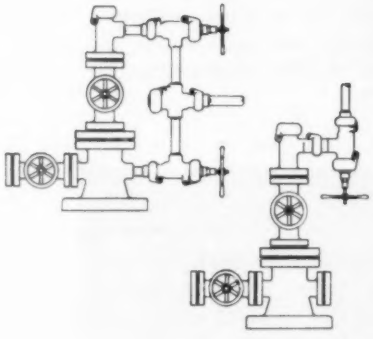




UNIBOLT

Flow Manifolds

make your trees lighter, yet stronger and more economical



Ask your Christmas tree supplier to furnish UNIBOLT Flow Manifolds (everything above the master valve). These compact, completely salvageable manifolds, consisting of a Tee or Cross, Adjustable Wing Valve, and Positive Choke Body, are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more metal in shear, actually results in a higher factor of safety for the manifold.

Furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6000, 10,000 and 15,000 lbs. test.

THORNHILL-CRAVER COMPANY

P. O. BOX 1184 HOUSTON, TEXAS

UNIBOLT

AGAIN O·C·T sets the

in dependable production equipment

The NEW O·C·T

Developed as a companion to the outstanding O-C-T JE Flow Controls which have gained universal acceptance, the new O-C-T JE Dual Flow Control is another step forward by O-C-T to provide the oil industry with the most economical and dependable production equipment on the market.

This new O-C-T Dual Flow Control replaces as many as thirteen different fittings,* reduces weight as much as 85 per cent, effects savings up to $700 when used to replace a 10,000 lb. test conventional double wing, provides a more flexible choice of chokes than any other dual assembly and the proven JE Flow Control floating gate design makes it operate easily even at extremely high pressures.

O-C-T Dual Flow Controls bring other advantages to the field. With this modern, compact dual flow control assembly, the operator may switch the flow from one sized choke to another without closing in the well and thus changing any of the wells production characteristics. This feature is extremely important when running pressure bombs, temperature surveys and other wire line instruments. Besides, the O-C-T Dual is the only compact dual assembly on the market in which the operator can use positive choke beans of any manufacturer. All parts in the O-C-T Dual Flow Control assembly can be replaced at the well site in a matter of minutes without removing it from the tree.

Write for complete engineering details or ask your O-C-T representative about the new O-C-T Dual Flow Control. It is now available through more than 700 supply stores. And there's nothing else like it under the Sun!

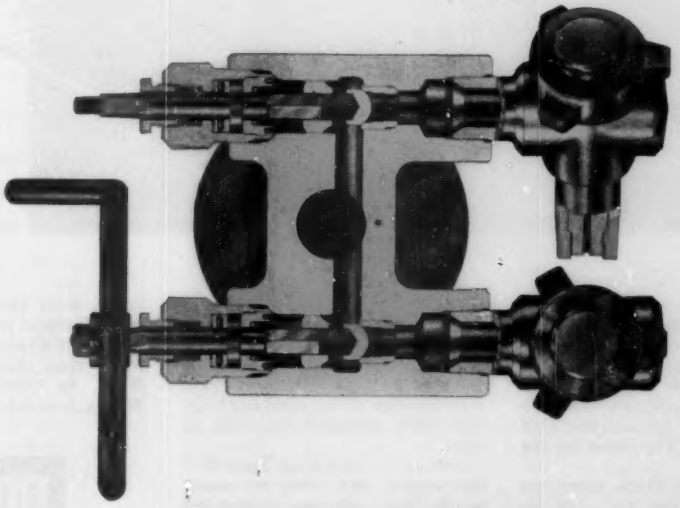
*Cross, bottom hole test connection, two-wing valves, four sets of studs and nuts, five-ring gaskets.

Oil Center Tool Co. P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas

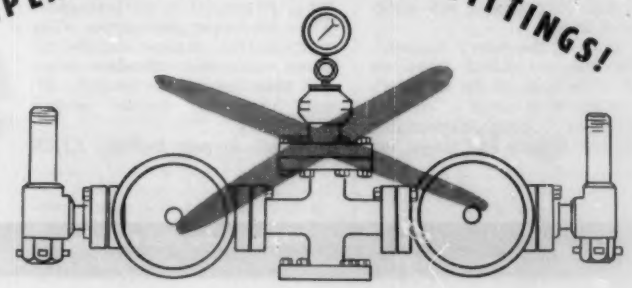
pace DUAL

FLOW CONTROL



IT REPLACES 13 DIFFERENT FITTINGS!

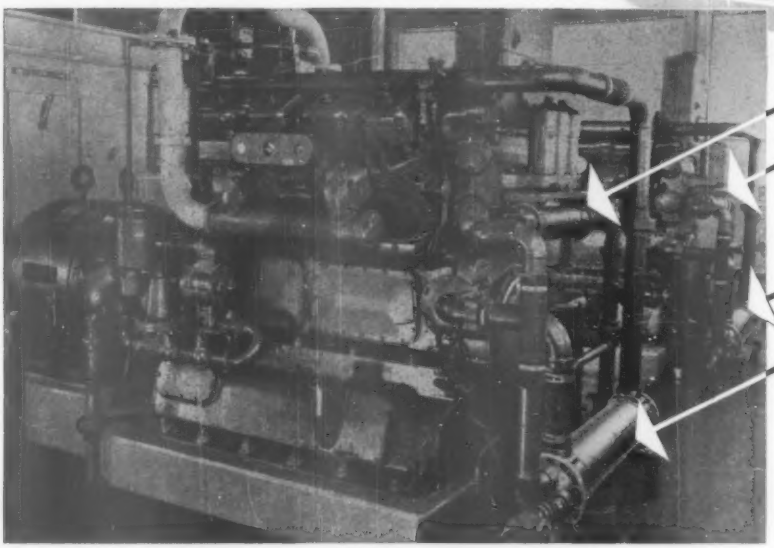
- . . . Reduces cost as much as 300%
- . . . Reduces weight as much as 85%
- . . . Uses any type positive choke bean
- . . . Provides easy operation even at extremely high pressures



in pumping station, oil field and pipeline operations

Ross Exchangers guard temperatures for CATERPILLAR diesels

REG. U. S. PAT. OFF.



In constant readiness to supply emergency standby power for the pumping station of a Michigan gas storage company, are these two Caterpillar D364 Diesel Electric Sets. Each is equipped with two Ross Type BCF Exchangers: One for the lube oil. The other for the cooling water.

Out in the oil fields, supplying power for drilling rigs — or on pipeline construction jobs, supplying power for ditchers — more Caterpillar Diesels are at work. *And more Ross Exchangers are working with them!*

In spite of the heavy responsibilities they're called upon to carry . . . in spite of the summer's heat or the wide range of stresses encountered . . . tough, dependable Caterpillar Diesels and tough, dependable Ross Exchangers always measure up, *with plenty to spare!*

The sound engineering that distinguishes Caterpillar Diesels is the very basis of selecting so vital a component as an exchanger. *Oil and water temperatures must be right!*

And so it is that Ross Type BCF Exchangers are used so extensively, not only on Caterpillar Diesels, but on the vast majority of all other makes. Their skillfully pre-engineered design assures long, dependable performance. Their all-copper and copper alloy construction means durability. Their complete standardization and mass production simplify design problems, enable prompt availability.

Details in new Bulletin 1.1K5. Write. ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corp., 1417 West Avenue, Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

Serving home and industry

AMERICAN STANDARD · AMERICAN BLOWER · ACME CABINETS · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

PETROLEUM CHEMICALS DIVISION
NEWS

May ★ One of a Series of Interest to the Petroleum Industry ★ 1952

Du Pont Purchases Plant Site in Texas

A 562-acre tract in the Beaumont, Texas area was recently purchased by the Organic Chemicals Department of the Du Pont Company. The Petroleum Chemicals Division, supplier of tetraethyl lead, is part of this department.

The plant site is bounded by the Neches River and the Kansas City Southern Railroad. Definite plans for plant construction on the new site have not yet been announced. The land, however, was purchased for the purpose of expanding the Company's regular manufacturing activities.

The location is conveniently close to an ample supply of petrochemicals . . . used in making many Du Pont products. There are now three major Du Pont Company plants in Texas, at Sabine, Victoria and Houston.

NEW DU PONT MARKETING AID...

Unique Mileage Calculator Now Available for Your Special Gasoline Promotions

Why does a motorist select *your* gasoline brand . . . or your competitor's?

Miles per gallon is, no doubt, one of his most important considerations—because he can *see* how it affects his pocketbook. That's why many car owners are interested in keeping score on gasoline mileage.

By giving the motorist an interesting gadget that helps him determine his mileage accurately, you can gain his friendship . . . and often create a favorable impression for your brand.

The new Du Pont gasoline mileage calculator is designed to help you do just that. It is essentially a circular slide rule with simple settings that tally miles-per-gallon performance.

The calculator accurately figures the mileage on fuel measured to the nearest fifth of a gallon. And a handy indicator, which the motorist sets with each tank filling, automatically keeps track of his previous mileage. But the tank has to be completely filled at each gas stop to enable the motorist to maintain a continuing check . . . which is, of course, to your advantage.

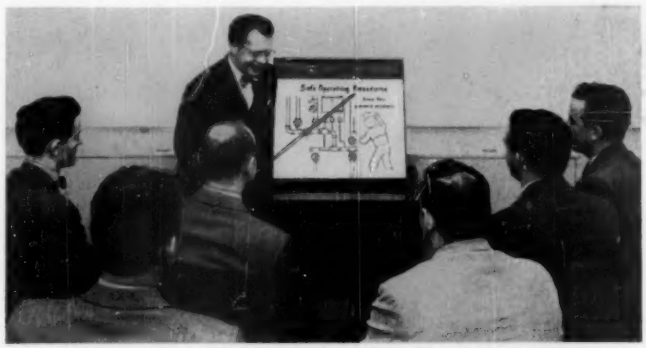
Complete instructions, plus *your* trade-mark and brand name are printed on the front of the calculator. It carries no other advertising. This makes it an ideal tie-in for your special promotions —such as the introduction of a new or improved gasoline, the opening of a new station, or as a low-cost write-in item for testing your advertising or radio program.

The Du Pont calculator design is available to oil companies who, in turn, would have them made with their own brand name and trade-mark in any desired quantity.

New Visual Training Aid On Blending Plant Safety Developed by Du Pont

"Safety" is always a password to the successful handling of tetraethyl lead. And uniform handling procedures are of prime importance in maintaining safety in the blending area.

Since tetraethyl lead was first used in gasoline in the early twenties when Du Pont developed a safe commercial method for making it, a variety of methods for training blending personnel have evolved.



THIS NEW DU PONT TEL SAFETY PRESENTATION can be clearly seen by a group of 20. And it is specially designed for convenient handling by the training instructor or discussion leader.

Now, to fill the need for a single, easy-to-understand tool for training prospective blending plant operators, and as a refresher course for experienced personnel, a carefully detailed turnover presentation has been developed by Du Pont. And this new visual training aid may well become the standard for training blending plant operators throughout the country.

CLEAR, SIMPLE

Stressing "correct operating procedures" as a means to safety, the presentation convinces viewers that correct operation, while not difficult, *is vitally important*. And the presentation is fortified with plenty of "reason why" to make its message penetrating.

For clarity and human interest, the turnover is made up of a series of easy-to-understand illustrations and diagrams. The simple, straightforward text on the back of the turnover is readily visible to the instructor, either for reading verbatim or as a guide for

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

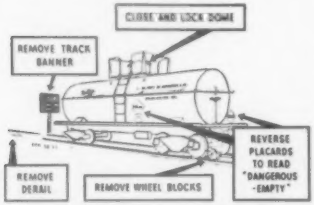
CONTINUED *Safety Turnover*

delivering the presentation with his own personal showmanship.

Big enough for visual impact, yet small enough for convenient handling, the 47 pages are 18⅝" by 24". Color has been added to many of the illustrations to show graphically and vividly the actual flow of liquids during the unloading and blending operations.

STEP BY STEP

The presentation is divided into two sections—tank car unloading and blending plant operation. Health precautions and the use of proper procedures are analyzed step by step.



A TYPICAL PAGE shows graphically the important steps in preparing a TEL tank car for release.

In addition to the actual turnover, protected by an attractive "Fabrikoid" binder, an "Instruction Manual" has been prepared to assist the speaker in the initial stages of becoming familiar with his presentation. The handy 8½" by 11" size of the manual permits the speaker to study his material at his desk, at home, on a plane or train without the necessity of handling the larger turnover.

NEVER.... touch anything contaminated with TEL compound without rubber gloves
ALWAYS... bathe thoroughly after working with TEL....

HUMOROUS FIGURES add interest to a serious point.

Suitable for either the novice or experienced blending crews, the new Du Pont turnover follows the style of the National Safety Council's "Safetygraph."

Coordinator of Du Pont District Laboratories

THE PROMOTION of ARTHUR F. BOWE to the position of Laboratory Coordinator was recently announced by the Du Pont Petroleum Chemicals Division.

Since 1949, Bowe has been manager of the Division's Eastern District Laboratory at Wilmington. This laboratory serves refineries on the Atlantic seaboard of the United States. He had previously been acting manager of the Gulf Coast District Laboratory at Houston, Texas, and supervisor of the analytical section of the Du Pont Petroleum Laboratory.

Before joining Du Pont in 1947, Bowe was with the Cities Service Oil Company at East Braintree, Mass. He was graduated, with a B.S. in chemistry, from Tufts College in 1939 and during his senior year was a teaching assistant in chemistry.

ARTHUR F. BOWE

Du Pont Historical Highlights

An early supplier of Du Pont was a Philadelphia firm that sold kegs to the powder mills. The containers were all sizes and qualities, causing confusion in sales and frequent losses from breakage and dampening of the powder. Later, Alfred Victor du Pont, son of the founder, built his own cooperage shop, designed a satisfactory standard keg and, thereafter, made the containers on the mill premises.

Today, containers, ranging all the way from paper envelopes to the tank cars carrying Du Pont's TEL, rank among the most important products Du Pont purchases. And Du Pont buys from more than 30,000 firms. Petroleum companies, suppliers of the petrochemicals used in making Du Pont products, rank well up among the firms supplying the largest volume of commodities bought by Du Pont.

MOVIES AND LITERATURE AVAILABLE

Here is a partial listing of the movies, bulletins, reports, booklets and aids available to you through the nearest Du Pont Petroleum Chemicals Division district office:

Safety for the Small Refinery — A 42-page book on how to set up an effective small refinery safety program..... Serial A-2848

Stability of Present-Day Gasolines — A 12-page paper on the value of storage tests — as compared with induction period—for determining stability of modern gasolines Serial A-3199

Pipeline on Wheels—A 26-minute, full-color movie on tank truck safety. Suitable for both training and public relations purposes.

Prints of Du Pont films are available to oil companies for training and public relations purposes. They may be borrowed or purchased.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: New York, N. Y. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

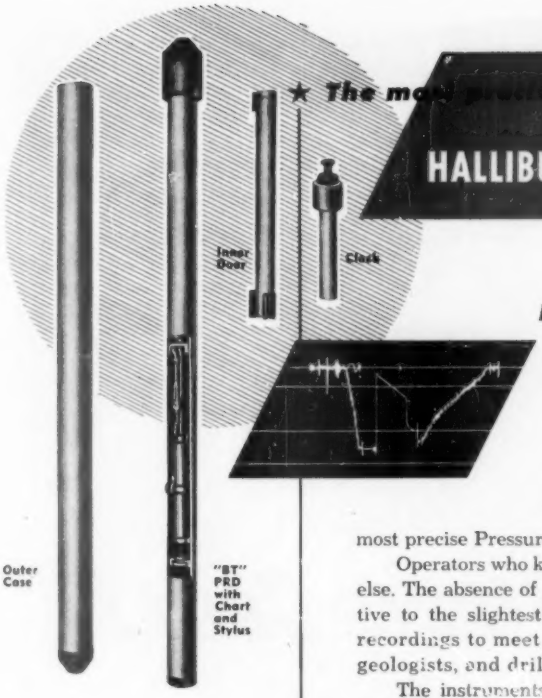
District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

IN CANADA: Canadian Industries Limited — Toronto, Ontario — Montreal, Quebec — Calgary, Alberta

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-3398

Printed in U. S. A.



★ The most precise pressure recording device

HALLIBURTON'S BOURDON TUBE

One of Many Reasons Why Halliburton's Best For Your Drill Stem Test

Greater accuracy of pressure recording can make a big difference in the test of your well. You get greater accuracy from the Bourdon Tube – the most precise Pressure Recording Device – and only Halliburton has it.

Operators who know about the Bourdon Tube won't have anything else. The absence of packing glands makes this instrument supersensitive to the slightest variations of pressure changes. It will produce recordings to meet the most exacting requirements of engineers, geologists, and drillers.

The instruments are supplied in pressure ratings from 5,000 psi to 15,000 psi, and are run with a blank chart made from sheet copper specially treated to withstand the high pressures met in present day deep testing.

The tester is equipped to make field readings of the chart at the completion of the test; however, these readings are checked on a micrometer optical chart reader at the laboratory. You get a *photographic* reproduction of this chart – which eliminates the chance for human error – plus a data sheet in your complete Testing Report.

The Bourdon Tube is a part of every Halliburton testing string. So is Halliburton's Standard Pressure Recording Device. You get *both* records – immediately after the test – *at no extra cost!*

Be sure you get this precise pressure recording with your next test. Phone your nearest Halliburton representative. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

MORE REASONS WHY HALLIBURTON'S BEST:

YOU GET BENEFITS OF BIG RESEARCH
Halliburton alone offers a testing service developed and improved by 25 years of energetic, grass-roots research.

MOST ADVANCED TOOLS AND TECHNOLOGY
Halliburton's highly specialized tools and exclusive features, its superior knowledge and technique, make misruns a rarity.

YOU GET MILLION-JOB EXPERIENCE
There's no substitute for experience in servicing an oil well. Halliburton alone offers you the enormous experience of service on more than a million jobs.

YOU'RE ONLY MINUTES AWAY
Halliburton has 177 field camps in the U. S. and Canada. That puts your Halliburton Tester only minutes away and ready to go as soon as you call.

YOU GET REAL PERSONAL SERVICE
Your Tester stays on the rig from start to finish of your test – giving you his full-time attention during this highly important operation.

★

HALLIBURTON

YEARS AHEAD IN DRILL STEM TESTING!

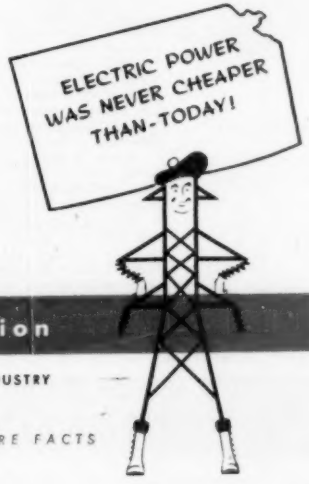
Goes Through When Others Can't!

The 4-Wheel-Drive Willys Station Wagon, powered by the high-compression *Hurricane* Engine, assures year-around transportation over all kinds of roads. It climbs a 66 per cent grade and goes through mud, sand, snow and roadless country that stops other cars. There is room for six passengers, plus luggage, tools or equipment. The rear seats easily lift out to provide 98 cu. ft. of cargo space. See your Willys dealer for a demonstration of this remarkable car.

4-WHEEL-DRIVE WILLYS STATION WAGON

Kansas producers have found there is no substitute for Low Cost Purchased Electric Power in the operation of pumping wells. For economy, dependability . . . perfect satisfaction . . . you can't beat *PEP. Savings soon pay out your original investment. Consult the Power Engineer of your nearest Electric Power Company. Let him explain — with no obligation — the many advantages that will be yours when you change to ECONOMICAL Purchased Electric Power.

*PEP — Purchased Electric Power



Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

MINNEAPOLIS-MOLINE
MODERN MACHINERY

5 big advantages for continuous duty and long life

- EXTRA HEAVY CONSTRUCTION
- STANDARDIZED QUALITY CONTROLLED PARTS
- SLUDGE-FREE OPERATION
- UNIFORM OPERATING TEMPERATURE
- PIONEER OIL FIELD APPLICATION EXPERIENCE

Length of engine life is determined by the stamina built into the parts. By comparing the weight and size of parts you can calculate how long they will last and give trouble-free continuous service.

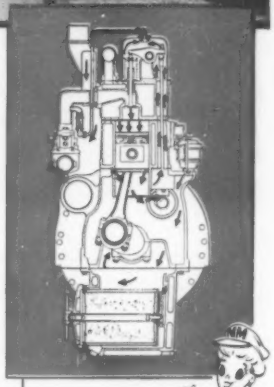
MM heavy-duty oil field engines have large diameter crankshafts, generous bearing surfaces, and heavy flywheel housing flanges that prevent deflection. Cylinder heads, removable cylinder blocks and crankcases are of thick wall design that eliminates distortion.

It is this extra margin of size and strength built into MM parts that makes them *stay put*, and makes MM engines stay on the job *longer!*

To back up this heavy-duty design under severe operating conditions, MM oil field engines have exclusive hot water jacketed base pans and metered vacuum crankcase ventilation. These features are proved by 10 years of continuous operation without major overhaul.

Get the facts about how these features prevent sludging and maintain uniform top to bottom temperature control under extremely unfavorable fuel and climatic conditions. Other MM cost-reducing features you will appreciate are the many standard parts, interchangeable on all power sizes that make possible finest precision and require minimum spare part stocks.

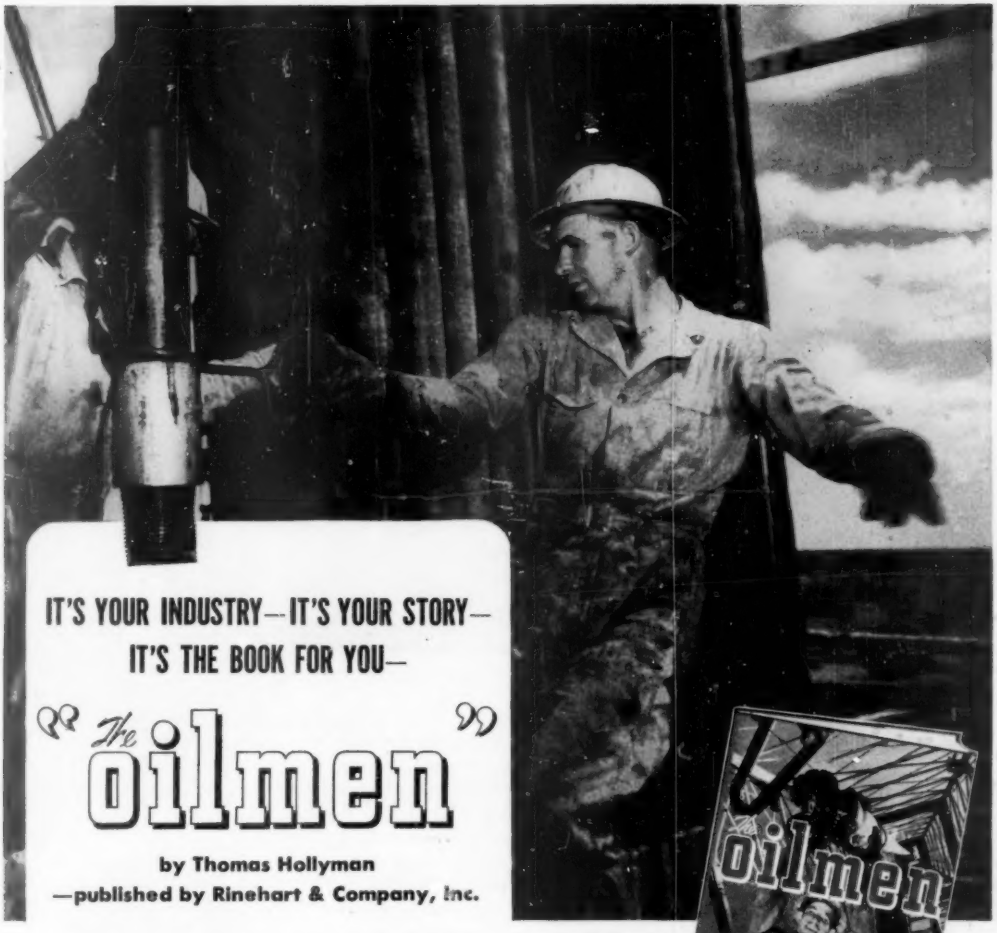
Quality Control IN MM FACTORIES ASSURES DEPENDABLE PERFORMANCE ON THE JOB



Minnie Moline's reminder: *"MM exclusive base pan and crankcase ventilation assure trouble-free operation."*

DISTRIBUTED BY
SHRIMPTON
Manufacturing & Supply Co.
LOS ANGELES Tel: Angelus 1-5122 • KILGORE Tel: 1241
OKLAHOMA CITY Tel: 33254

MINNEAPOLIS-MOLINE MINNEAPOLIS 1, MINNESOTA



IT'S YOUR INDUSTRY—IT'S YOUR STORY—
IT'S THE BOOK FOR YOU—

"The oilmen"

by Thomas Hollyman
—published by Rinehart & Company, Inc.

$1.50 ACTUAL SIZE 10¼" x 10¼"

It's a book you'll use hundreds of times ...the picture story that captures the personality of an industry

● Consulting photographic editor of *Holiday*, and a contributor to other leading magazines, Tom Hollyman now turns his lens on *oil*—to tell its exciting story in terms of the industry's men and women.

Dramatically photographed, concisely written, cloth-bound and oversize, "The Oilmen" tells petroleum's full story from search to discovery . . . through production, refining, transportation, marketing . . . to the ultimate user's door. It's a book the industry has needed for years, a book that every man and woman associated with petroleum must see, read, own.

"The Oilmen," published by Rinehart & Company, Inc.

at all leading book stores—or send coupon

Shell Oil Company and its employees co-operated with Mr. Hollyman to make this picture story possible—and offer this announcement as a service to the men and women who have made oil the nation's No. 1 source of energy.

Rinehart & Company, Inc., Dept. 25
232 Madison Avenue, New York 16, New York

Please send me——copies of THE OILMEN @ $1.50.
I enclose check or money order in the amount of $——

Name_____

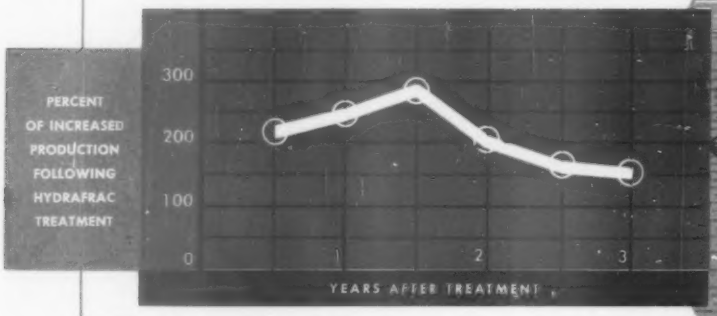
Address_____

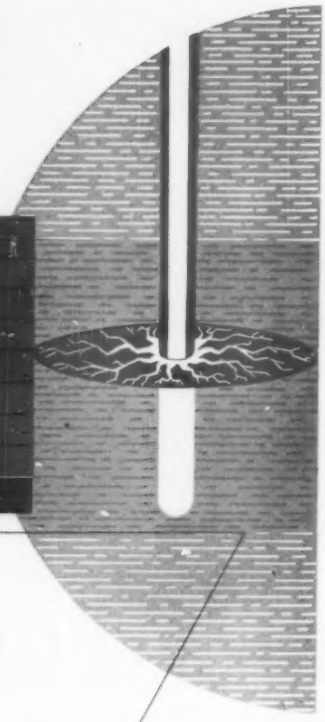
_____

TWO-YEAR AVERAGE PRODUCTION INCREASE.....200%

HALLIBURTON'S HYDRAFRAC SERVICE

SUSTAINS GREATER PRODUCTION!





Time alone will tell the maximum recovery by production increase due to Halliburton's Hydrafrac Treatments. Today, however, data is available on a group of 25 wells in *different* fields that were treated when Hydrafrac Service was new.

Two years after treatment, 60% of these wells showed a sustained production increase of 200% more than pre-Hydrafrac production. Since the cost of Hydrafrac Service paid for itself during the first six months, the production increase shown on the plotted curve is *net!*

Results in Spraberry fields are spectacular but that is by no means the only area where Hydrafrac Service is successful. It has made substantial increases in many widely separated fields and different formations – sands, limes, and conglomerates.

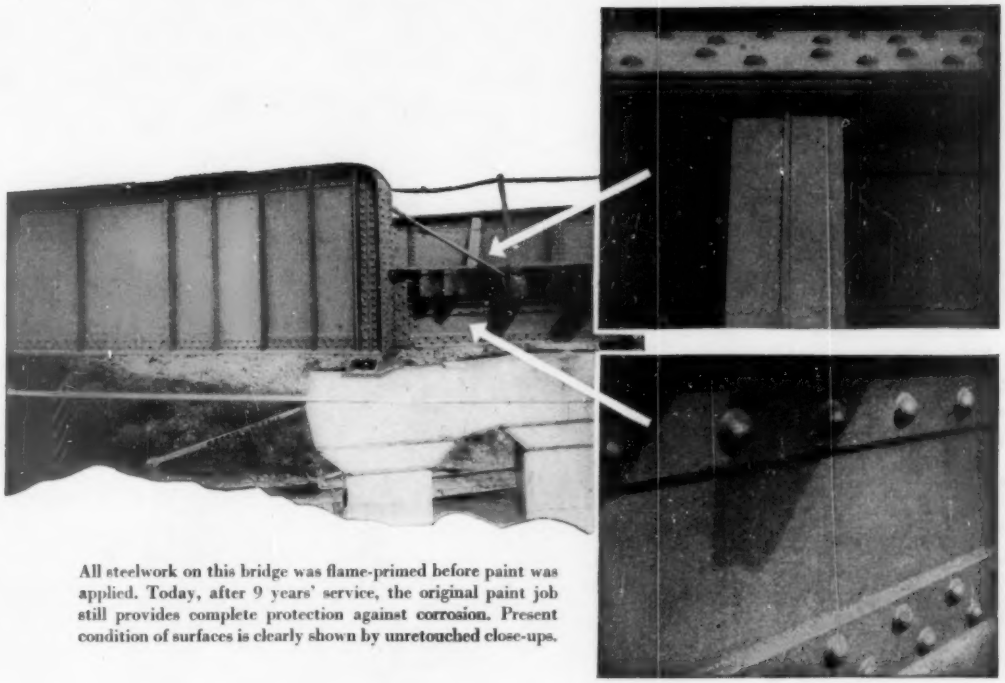
Hydrafrac Service, the *original* fracturing method, comprises use of a viscous hydrocarbon gel carrying graded sand particles capable of holding the fractures open, chemicals to reduce the gel viscosity, and packers and pumping equipment for producing fracturing pressures.

More and more operators are using the process as a completion means. It's more economical and convenient while the rig is over the hole and postpones the time when additional well stimulation is required. Halliburton Oil Well Cementing Company, Duncan, Okla.

Don't pass up any possible pay, in new wells or old. Find out first if Halliburton's Hydrafrac Service can make it a profitable producer. Phone your nearest Halliburton Representative — he will assist in the selection of wells for Hydrafrac Service which have high possibility for success.

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

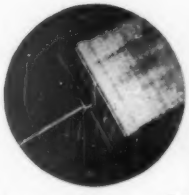
HALLIBURTON



All steelwork on this bridge was flame-primed before paint was applied. Today, after 9 years' service, the original paint job still provides complete protection against corrosion. Present condition of surfaces is clearly shown by unretouched close-ups.

Your Steelwork . . .

How Will It Look in 1960?



Steelwork you coat with good paint today can still look like new ten years from now, *if you flame-prime all exposed surfaces first.* And what you'll save on maintenance, because of increased protection due to flame-priming, will more than pay for all the flame-priming apparatus and materials you need for the job.

Flame-priming is simple to do, requires little equipment, and costs little. A brush of oxy-acetylene flames pops off scale and drives out moisture. Paint applied to the warm, dry surface goes on quickly and smoothly, bonds tightly, and lasts longer.

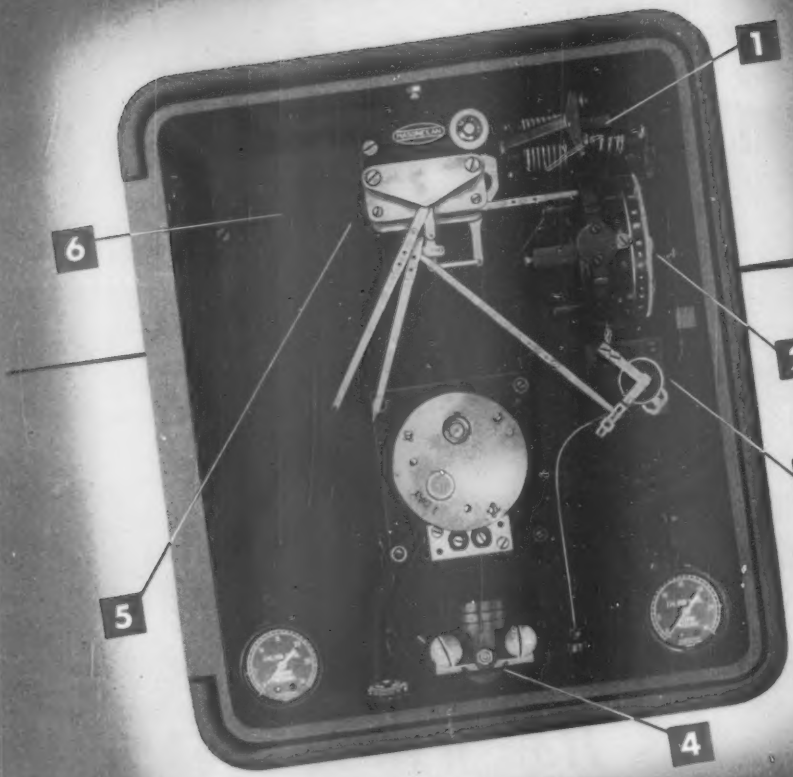
Flame-priming is one of many time- and money-saving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost.

To find out, without obligation, telephone or write our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Linde
Trade-Mark

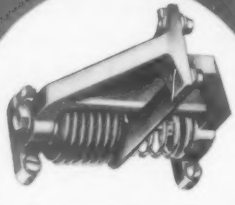
Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

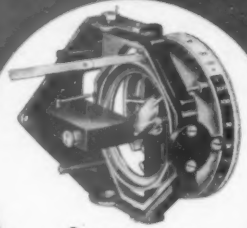


An

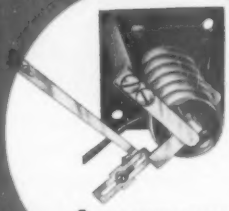
MASONEILAN 60000 SERIES PNEUMATIC CONTROLLER



1. PROPORTIONAL UNIT
interchangeable with proportional-reset unit.



2. GIMBAL UNIT
combines primary and feedback motions — basic in all controllers.



3. PRIMARY ELEMENT
helical or spiral bourdon, or bellows as required.

A HIGH Quality PRODUCT

Instrument Mans Instrument

MASONEILAN

The New Masoneilan "6-in-1" Controller
IS SIMPLE AS A B C

One Setting of basic "6-in-1" controller

selects on-off, proportional, or differential-gap control; direct or reverse action; proportional band or differential-gap setting.

Easy to Set, Adjust, Test and Service —

all settings made without removing chart; all subassemblies complete and directly accessible; all air passages manifolded; four-position transfer switch in manual control subpanel.

Easy to detach and interchange subassemblies

from backplate-manifold to vary desired control function; for cleaning or servicing.

Available Now for Prompt Delivery

4. RELAY PILOT
with cleanable orifice and integral filters.

5. PEN MOVEMENT
includes gearless index setting.

6. BACKPLATE-MANIFOLD
supports subassemblies; conceals, supports, tubing; eliminates fittings. (Rear View)

MASON-NEILAN REGULATOR CO.
1185 ADAMS STREET, BOSTON 24, MASS., U. S. A.

Sales Offices or Distributors in the Following Cities:
New York • Syracuse • Chicago • St. Louis • Tulsa • Philadelphia • Houston • Pittsburgh • Atlanta • Cleveland Cincinnati • Detroit • San Francisco • Salt Lake City • El Paso • Boise • Albuquerque • Charlotte • Los Angeles Denver • Appleton • Corpus Christi • New Orleans • Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

You get a GREEN LIGHT all the way

with Quality Controlled PITT CHEM Plasticized Enamel

AS a basic producer of quality-controlled pipeline enamels, Pittsburgh Coke & Chemical keeps you rolling down the line with deliveries as scheduled. *We have never failed to meet a delivery promise!*

What's more, you'll cover more miles per day with Pitt Chem Enamels. Pitt Chem Plasticized grade, for example, heats up faster, flows better from kettle to pipe and coats more pipe per ton because of its consistent top quality and uniform application characteristics.

As a basic and integrated producer, we control every phase of production from coal to finished product—in a plant devoted *exclusively* to coal tar coatings. ● We're always ready to help you do a better and faster pipeline coating job. We'll gladly send technical data—or provide you with field application assistance when needed.

★ Standard Grade Tar Base Enamel
★ Modified Grade Tar Base Enamel
★ Plasticized Grade Tar Base Enamel
★ Cold Applied Tar Base Coatings

PROTECTIVE COATINGS DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

No. 5 in a series of advertisements on the BIW Non-Lubricated Gate Valve.

CORROSION AND EROSION RESISTANT

Hard-Faced Seats and Gates of Chrome Alloy Proved by more than 32,000 Valves in Christmas Tree Service

BIW

NON-LUBRICATED GATE VALVE

Oil — Water — Gas to 5000 pounds W P

BEAUMONT IRON WORKS CO.

BEAUMONT, TEXAS

A Subsidiary of American Locomotive Company

Atlas Engineering Works, exclusive sales agents

Almost

LE ROI

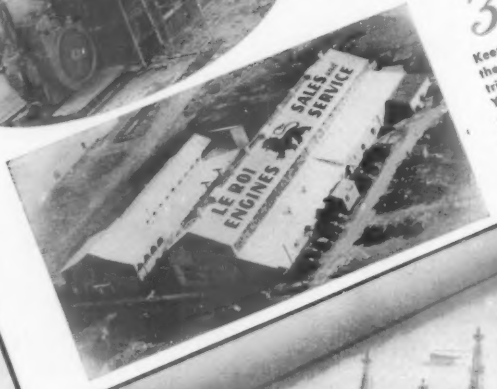
Le Roi 3 way Partnership

1. Better Engines

Le Roi's A288, for example. It has a wide speed range of 360 to 720 rpm. Its removable wet cylinder sleeves and other construction features simplify maintenance, reduce replacement costs. No shut-down is necessary for periodic inspections.

2. Better Applications

Exclusive Le Roi distributors are oil-field power specialists. They know engines. That's why they can select the right power unit for any application. That's why you can count on Le Roi for dependable, low-cost power.



3. Better Service

Keeping your Le Roi engines running is the sole responsibility of our distributors. They handle only Le Roi. You get personal attention from engine experts. Large parts-stocks and skilled mechanics assure prompt service and a minimum of down-time.

Indestructible!

Le Roi A288 Pumping Engine

One typical installation shows more than 35,000 hours and it's just beginning its useful life. That's stamina — proof that Le Roi's A288 puts you way ahead of the field!

YOU don't have to pamper this pumping engine. No, sir — not Le Roi's A288. It's built to pump more oil — longer — safer — and with less maintenance — than any other well-pumping engine!

The A288 is the only engine to be recommended by one major pumping-engine user for continuous service *unattended for up to two weeks at a time.*

Here are just a few of the reasons for the A288's unfailing dependability:

- Patented, closed "vaporizing-condensing" cooling system requires almost no make-up water — keeps temperatures high and prevents sludging even in sour-gas areas.
- Heavy flywheel maintains even-speed operation under unbalanced loads.
- You don't have to shut down the A288 for periodic inspections or for adding oil.
- Big crankcase oil capacity permits long intervals between oil filling.
- There are no grease fittings, belts, or other accessories that need attention.

Let your Le Roi distributor tell you more about the A288 — and show you installations. See for yourself why you're way ahead of the field, when you let Le Roi's 3-way partnership work for you.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

***Plants:* Milwaukee • Cleveland • Greenwich, Ohio — *Oil Field Headquarters:* Tulsa, Oklahoma**

LE ROI

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

Typical Le Roi Service Facility

Here's the efficient well-arranged parts department of the Le Roi-Rix Co.'s Long Beach branch. Two more offices — at Bakersfield and Los Angeles — are similarly equipped. All three offices maintain prompt 24-hour service. Le Roi has service facilities like these throughout the oil fields — another reason why you can depend on Le Roi.

Michigan
Hofer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

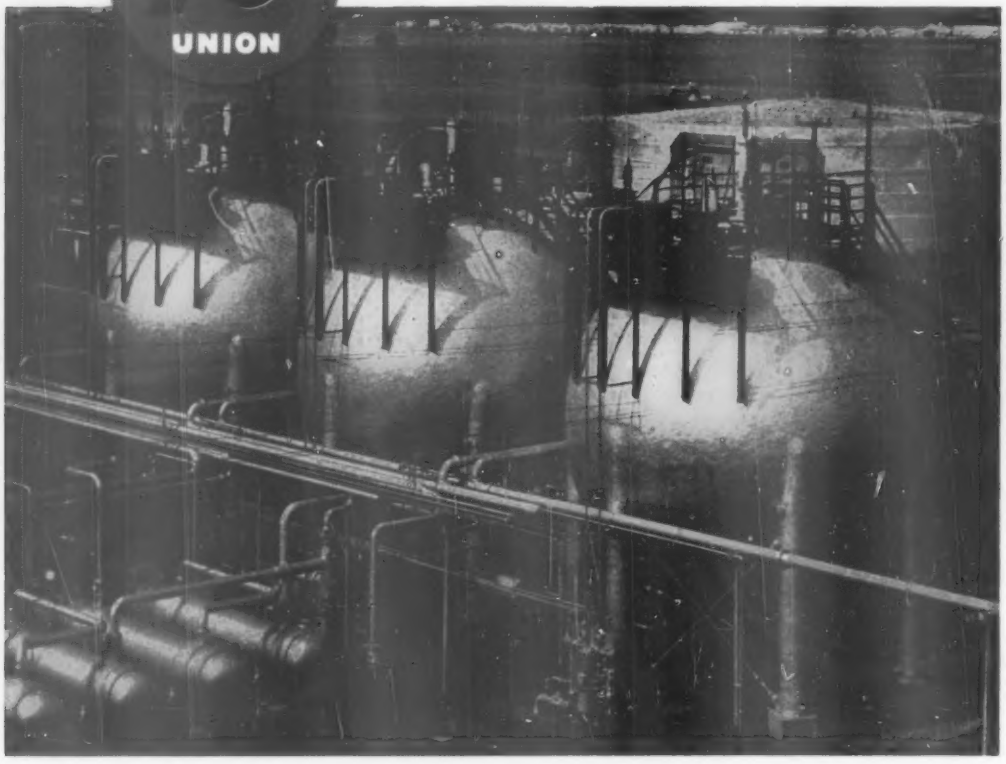
Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-511

76 UNION

another leading refiner who desalts with PETRECO



The Union Oil Company is recognized as a leader in the petroleum industry. In its effort to deliver the best products possible, there can be no compromise with poorly performing equipment or inadequate service. Like many other leading refiners, the Union Oil Company utilizes Petreco Electrosphere Desalting to protect refinery equipment from damage due to harmful salts in the crude charge.

Petreco Electrosphere Desalters are in daily use by leading refiners all over the United States, Canada and South America. These refiners have learned that the high-efficiency performance of Petreco desalters reduces crude oil salt-content to an inconsequential minimum. They have found that short runs, frequent shut downs, reduced unit capacities and excessive cleaning and repair costs are not necessary liabilities, but often can be corrected by efficient desalting.

Petreco desalting engineers are available in every refining area. They are always ready to discuss your particular problem and to tell you of the benefits to be attained by desalting the crudes you are charging. Get all the facts about Petreco Desalting, today.

PETRECO

SPECIALIZED Electric PETROLEUM PROCESSES { DESALTING / DEHYDRATING

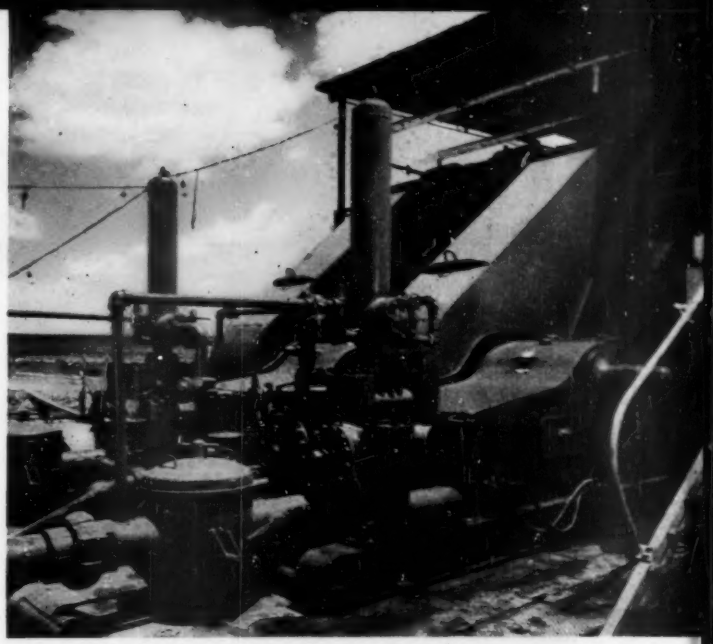
Petrolite Corporation, Ltd.
PETRECO DIVISION
3202 South Wayside Drive, Houston 3, Texas
1390 East Burnett Street, Long Beach 6, California

PR 52-1

"you can't beat

EMSCO 'D' SERIES POWER SLUSH PUMPS

for downright dependability"



D-500 Emsco Power Slush Pumps manifolded so that they may be operated in series. This installation was photographed in West Texas.

From spudding in to final well completion, Emsco D Series Power Slush Pumps are your best bet to maintain needed volumes and pressures. They do the job efficiently and dependably . . . without costly downtime.

Emsco D Series Power Slush Pumps give you more horsepower per pound, because Emsco's unique *fabriform* construction eliminates all extra bulk and weight. As a result, Emsco pumps are lighter . . . easier and more economical to transport and rig up.

Operating is easier, too. There are no power end adjustments to make. No greasing to do. Lubrication is completely automatic. Emsco's *exclusive* exposed liners enable you to detect and correct liner packing leakage.

Today, more and more operators are standardizing on Emsco D Series Power Slush Pumps. ***They're the world's simplest and easiest slush pumps to operate and maintain!***

EMSCO SLUSH PUMPS ARE AVAILABLE IN THESE SIZES:

D-175:	175 hp. at 75 rpm.	**D-500:**	500 hp. at 65 rpm.
D-300:	300 hp. at 70 rpm.	**D-850:**	850 hp. at 60 rpm.

EMSCO

REG U.S. PAT. OFF.

EMSCO DERRICK & EQUIPMENT COMPANY

Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

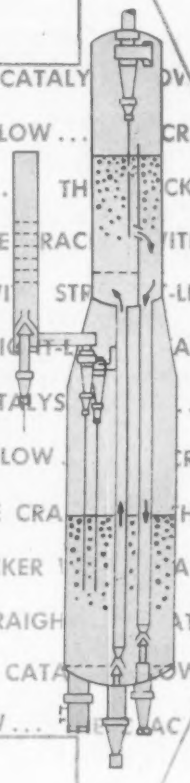
Distributors: Bovaird Supply Company, Tulsa, Oklahoma. Mid-Continent Supply Company, Fort Worth, Texas. Oil Equipment, Ltd., Calgary, Alberta. *Export Distributor:* Mid-Continent Supply Co., Inc., 42 Broadway, New York 4, New York.

E-118-52

The Logical "Next-step" in Economy and Efficiency . . .

GHT-LINE CATALYST FLOW . . . THE CRACKER WITH STRAIGHT-LINE CATALY
TALYST FLOW . . . THE CRACKER WITH STRAIGHT-LINE CATALYST FLOW . . .
'ST FLOW . . . THE CRACKER WITH STRAIGHT-LINE CATALYST FLOW .
W . . . THE CRACKER WITH STRAIGHT-LINE CATALYST
CK
ITH
T-LINE
ATAL
N
IE CRACKER WITH STRAIGHT-LINE CATALYST FLOW
WITH STRAIGHT-LINE CATALYST FLOW . . . THE CRACKER WITH STRAIGH
GHT-LINE CATALYST FLOW . . . THE CRACKER WITH STRAIGHT-LINE CATA
YST FLOW . . . THE CRACKER WITH STRAIGHT-LINE CATALYST FLOW . . .

Kellogg Orthoflow



ORTHOFLOW, the latest **Kellogg** advancement in **Fluid** catalytic cracking, not only merges reactor and regenerator into a single vessel, but provides *straight-line transmission* for both catalyst-oil mixture and spent catalyst—in a system free from slide-valves and expansion joints.

As a result, **Orthoflow** costs less to build, costs less to maintain and is more flexible in operation. It requires less structural steel, smaller foundations, simplified piping. Straight-line catalyst flow minimizes erosion and increases efficiency.

An **Orthoflow** unit can handle practically any feed-stock, from kerosene to the heaviest gas oil. High-boiling stocks are charged as liquids and vaporized by the hot catalyst, with minimum use of pre-heat facilities. Furthermore, **Orthoflow** units permit wide latitude in conversion . . . operate effectively over a wide range of feed rates to meet changes in a refinery's requirements.

Orthoflow, the logical "next-step" in catalytic cracking progress, derives from Kellogg's basic experience—dating from the inception of Fluid catalytic cracking—and the engineering of more than 70 percent of the world's total **Fluid** cracking capacity.

The latest issue of the KELLOGGRAM —"From Baton Rouge to Orthoflow"— presents the details on this new cracking development. Available on request.

THE M. W. KELLOGG COMPANY

(A Subsidiary of Pullman Incorporated)

NEW YORK JERSEY CITY LOS ANGELES TULSA HOUSTON TORONTO LONDON PARIS

KELLOGG

PROGRESS REPORT
ORTHOFLOW CATALYTIC CRACKERS

UNITS OPERATING:
In Western Canada— 2,500 BPD Unit
In Mid-Continent U. S.—8,300 BPD Unit

UNITS UNDER CONSTRUCTION:
In Eastern Canada—8,300 BPD Unit

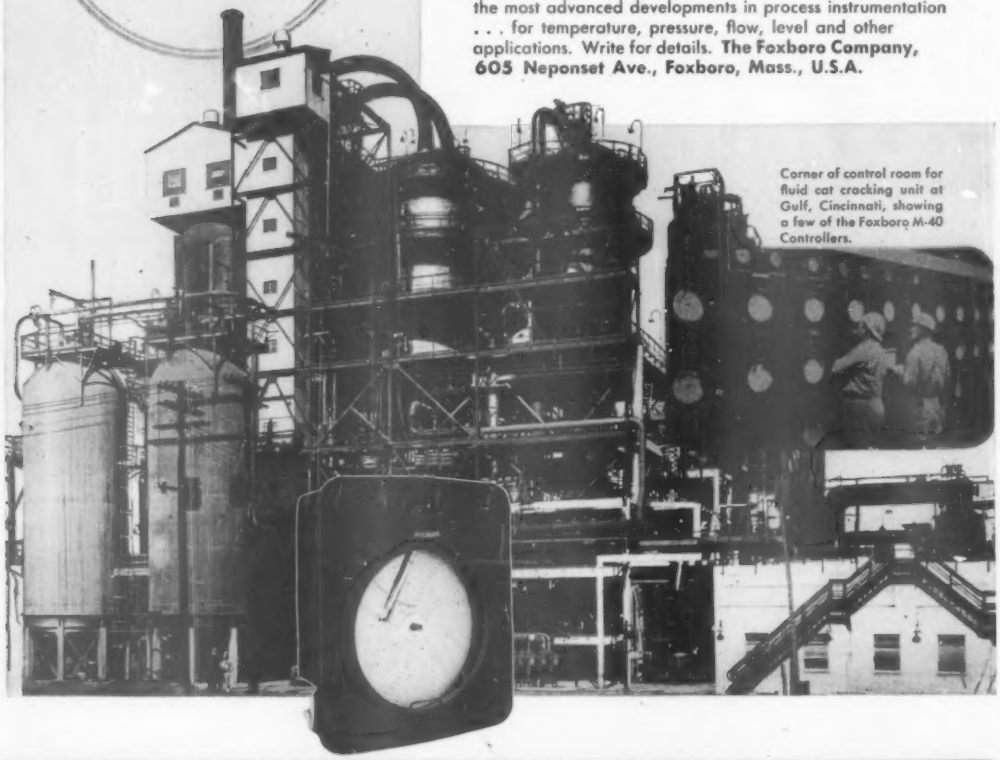
UNITS IN ENGINEERING:
On the Atlantic Seaboard—28,000 BPD Unit
In Mid-Western U. S.—17,000 BPD Unit
On the Gulf Coast—26,000 BPD Unit
In Europe—5,000 BPD Unit

.....for fifty one years an integral part of petroleum refining progress!

GULF'S NEW CAT CRACKER
demonstrates why refineries prefer Foxboro M-40 controllers

The ultra-modern fluid catalytic cracking unit at Gulf Oil Company's 28,000-barrel Cincinnati Refinery offers another example of the consistent performance that has won the petroleum industry's confidence in Foxboro M-40 Controllers. For this exacting new process, M-40 Controllers were selected because of their previous performance at Gulf . . . "an outstanding record of high accuracy, reliability, ease of maintenance and freedom from variation." In the 2 years since their installation at Cincinnati, they have continuously maintained this record!

Gulf, Cincinnati, is only one of many leading refineries that base their control systems on M-40 . . . the finest modern controller. The Foxboro M-40 Controller gives you the most advanced developments in process instrumentation . . . for temperature, pressure, flow, level and other applications. Write for details. **The Foxboro Company, 605 Neponset Ave., Foxboro, Mass., U.S.A.**



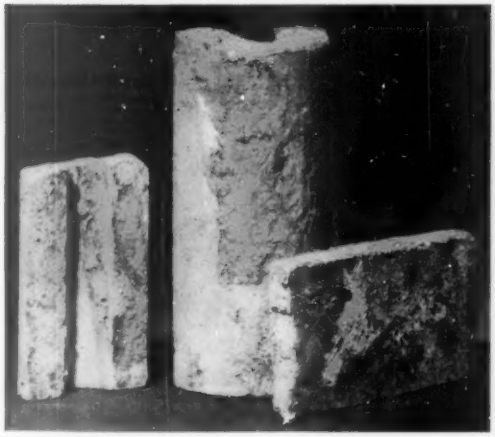
Corner of control room for fluid cat cracking unit at Gulf, Cincinnati, showing a few of the Foxboro M-40 Controllers.

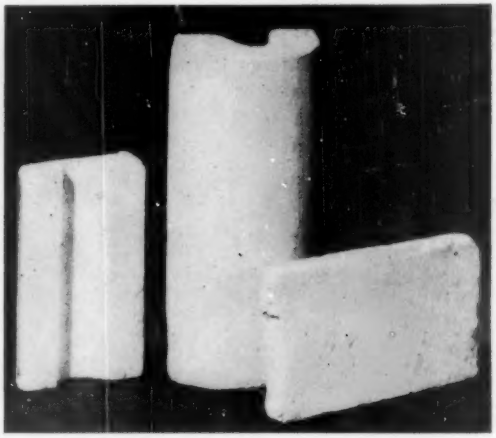
FOXBORO REG. U. S. PAT. OFF. **M-40 CONTROLLERS**

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

CAUGHT IN A FLOOD

...Dug Out of the Mud, Kaylo Heat Insulation Proved Still Usable!





WATER SOAKED AND CAKED WITH MUD, these three pieces of Kaylo Heat Insulation were found partially buried in the Kansas City, Missouri, warehouse of Procter & Gamble after nearly two weeks of Missouri River flood water had receded. The unretouched photograph above shows the wet and mud covered pieces as they looked on arrival at the laboratories in Toledo, Ohio after shipment in a loosely-packed carton.

THE SAME THREE PIECES are shown in this unretouched photograph after they were cleaned by holding them under a water faucet and rubbing by hand, then dried with an electric fan. These pieces are still usable—*proof* of Kaylo Heat Insulation's resistance to water damage. Other Kaylo Heat Insulation, already installed at this plant, was under water during the flood, yet is still in place and performing efficiently.

Kaylo Heat Insulation is a hydrous calcium silicate — the heat-saving material that is revolutionizing insulation practice with its outstanding combination of advantages.

WRITE FOR FREE BOOK—"Kaylo Heat Insulation." Address: Dept. N-232, Owens-Illinois Glass Company, Kaylo Div., Toledo 1, Ohio.

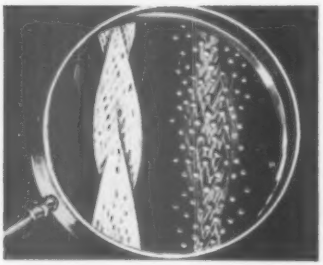
KAYLO® ... *first in calcium silicate*

...*pioneered by* OWENS ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO — KAYLO SALES OFFICES: ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

She Doesn't Care!

1. **Water** will leave almost no wrinkles in her dress, thanks to a new fabric woven of resin-treated cotton fibers that tend to return to their original shape after dousing or crushing. This amazing cloth stays clean longer and wears better.



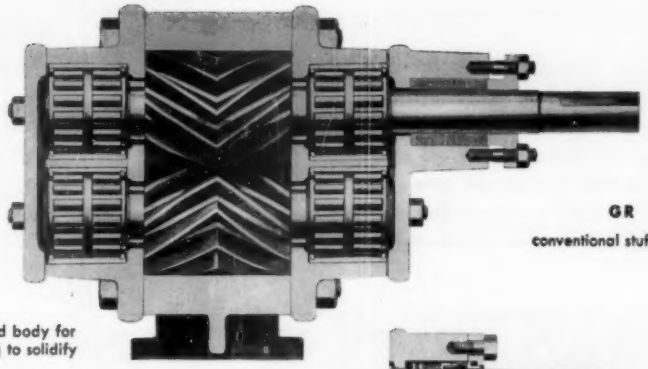
2. **To create** this fabric, scientists add to a natural product—cotton—a synthetic that becomes an integral part of the fiber itself. In just this same way, Conoco scientists developed Conoco Super Motor Oil, by adding to a natural product—oil—additives that keep your engine clean, protect it from wear, fight acid, sludge, and rust.

3. **50,000 Miles—No Wear!** After a punishing 50,000-mile road test, *with proper drains and regular care*, engines lubricated with Conoco Super showed *no wear of any consequence:* in fact, an average of less than one one-thousandth inch on cylinders and crankshafts. Gasoline mileage for the *last* 5,000 miles was actually 99.77% as good as for *first* 5,000. Proof that Conoco Super, with OIL-PLATING, *can* keep your new car new!

Now in its 77th year, Continental Oil Company is a leader in oil research and a pioneer in oil-perfecting additives with more than 100 patents on discoveries that improve performance and lengthen the life of your car.

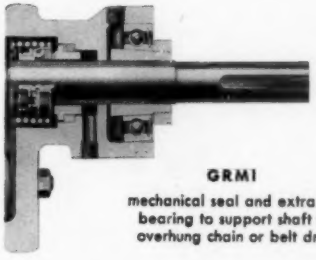
© 1952 **CONTINENTAL OIL COMPANY**

GRJ
steam-jacketed body for liquids tending to solidify

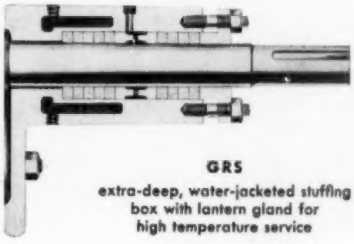


GR
conventional stuffing box

GRM
mechanical seal



GRMI
mechanical seal and extra ball bearing to support shaft for overhung chain or belt drive



GRS
extra-deep, water-jacketed stuffing box with lantern gland for high temperature service

NOW...the most complete line of gear pumps

with interchangeable stuffing boxes to meet varying job requirements

There's a Worthington gear pump now for every service where you want a rotary.

Worthington's GRM with mechanical seal rounds out a line of internal roller bearing rotaries that will fill any requirements from 1 to 5000 gpm; pressures up to 500 psi.

Using the same body, gears and shaft, you can now have a Worthington gear pump for any sealing problem—as shown in the illustration. All parts are interchangeable.

The single stuffing box is subject to suction pressure only.

Better Efficiency, Longer Life with Herringbone Gears

Worthington uses double helical gears on its gear-type rotaries in order to eliminate end thrust, prevent trapping of the liquid, reduce wear on bearing surfaces.

All shafts and plates are the same size for easy interchangeability.

So this new rotary again illustrates the *completeness* of the Worthington line—the fact that "The World's Broadest Line Assures You the Right Pump for Every Job".

Send coupon for new bulletin on Worthington gear-type rotaries. Please attach to your business letterhead.

WORTHINGTON

ROTARY PUMPS

P.1.7

Worthington Pump and Machinery Corp.
Reciprocating Pump Division
Harrison, New Jersey

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

Scientifically blended
Seals formation while drilling
Soluble in crude oil
No permanent blocking to oil zone
Two blends—coarse and fine
Adds to any type mud
Costs less than most others

for lost circulation

"FORMASEAL"

FORMASEAL is a special type of air-blown asphalt that is mixed into the drilling mud (either water-base, oil-emulsion, or oil-base) to prevent loss of circulation. It forms a composite mat on the walls of the well, and plasters off porous formations with immediate results. FORMASEAL *is entirely soluble in crude oil, and will not permanently plug the producing formation.*

PARTICLE-SIZE GRADATIONS

FORMASEAL has particle size gradation which varies from powder to pellets. Field tests have proven that blending has important advantages. Under temperature and pressure, the FORMASEAL particles tend to bond together and form a tenacious plastic cake, unlike other lost circulation materials. This unique feature allows FORMASEAL to function also in water base mud.

FINE AND COARSE BLENDS

FORMASEAL is prepared in a fine blend and a coarse blend. The fine blend is graded from 325 mesh to 8 mesh with about 75% passing 32 mesh. The coarse blend is graded from 4 mesh to 100 mesh with about 85% coarser than 20 mesh. Generally, the greater the loss of mud, the coarser the blend required, but blending of the two will often produce better results, depending upon the conditions in the hole.

METHODS OF USE

With oil base mud or crude oil, FORMASEAL may be added directly to the mud stream while circulating and prior to entering the anticipated lost circulation area, or may be spotted in a "pill" after lost circulation has started. With water base or oil emulsion mud, it is recommended that FORMASEAL be utilized after lost circulation has started in order to avoid recirculating floating globs of asphaltic material.

LOWEST IN COST

FORMASEAL is a black, granular, vari-shaped material, sacked in 50 lb. paper sacks. This material is not subject to bacterial action and can be conveniently stored. It is added through the hopper in the normal manner or directly to the suction pit. FORMASEAL is one of the lowest priced lost-circulation preventatives on the market. For complete details, inquire at any OBI office, or write to main office at Compton.

OB PRODUCTS

Black Magic
OB Gen
OB Gel
OB Zero
OB Wate
Econo Magic
Voodoo Dust
OB Well Wash
OB Mud Guns
OB No-Glo

White Magic
Chemical "Y"
Chemical "X"
OB Mix Fix
OB Hevywate
Pepto Magic
Magic Milk
Test Equipment
Hand Cleaner
OB Formaseal

OIL BASE INC.

130 Oris Street
Compton, California
Houston plant
8200 Market Street Road
Odessa plant
Kermit Highway

branch offices:
Bakersfield
Long Beach
Ventura
Newhall
Houston
Fort Worth
Corpus Christi
Oklahoma City
Midland
Odessa

export offices:
Elmer R. Smith, Caracas
Courtland Parfet, Paris, France
G. Saavedra E. Hijos, Mexico, D. F.
Cable Address—OBI

Sweat-Resistant Bol Tan
leather insole stays soft and pliable

These two bottoms, from one pair of shoes, were worn in a foundry for 7 months. The left shoe has a Bol Tan Leather Insole, the right one an ordinary insole.

Results speak for themselves. Only the Bol Tan Leather Insole resists the damaging attacks of perspiration.

Note Bol Tan Leather Insole remains soft and pliable as demonstrated by section cut and lifted for inspection.

Ordinary insole is cracked, curled, saw-edged and dried out . . . damaged by perspiration.

Bol Tan Insole remains comfortable, permits re-soling when ordinary leather insoles would have failed!

Ordinary insole is unfit for further wear. Result: Shoe is discarded long before uppers are worn out!

Only Hy-Test has Bol Tan

Sweat-Resistant leather insoles

a PLUS value at NO EXTRA COST means up to twice the wear and extra comfort, too!

Be sure your workers' feet are protected by HY-TEST Safety Shoes . . . and you make sure of the comfort that pays off in productive man hours. You also save workers' money they spend for extra pairs to match the longer wear Bol Tan leather insoles assure in HY-TEST safety shoes.

HY-TEST SAFETY SHOES

HY-TEST ANCHOR FLANGE® SAFETY SHOES

*TRADEMARK REG. U. S. PAT. OFF.

The World's Largest Selling Safety Shoe

Division of International Shoe Company, St. Louis 3, Mo.

New York Office: Suite 1708, 225 W. 34th St.

Use this handy coupon for details on HY-TEST's Bol Tan leather insoles.

HY-TEST SAFETY SHOES, Dept. OG5
Division of International Shoe Company
St. Louis 3, Missouri

Please send me free copy of your folder explaining the advantages of Bol Tan leather insoles.

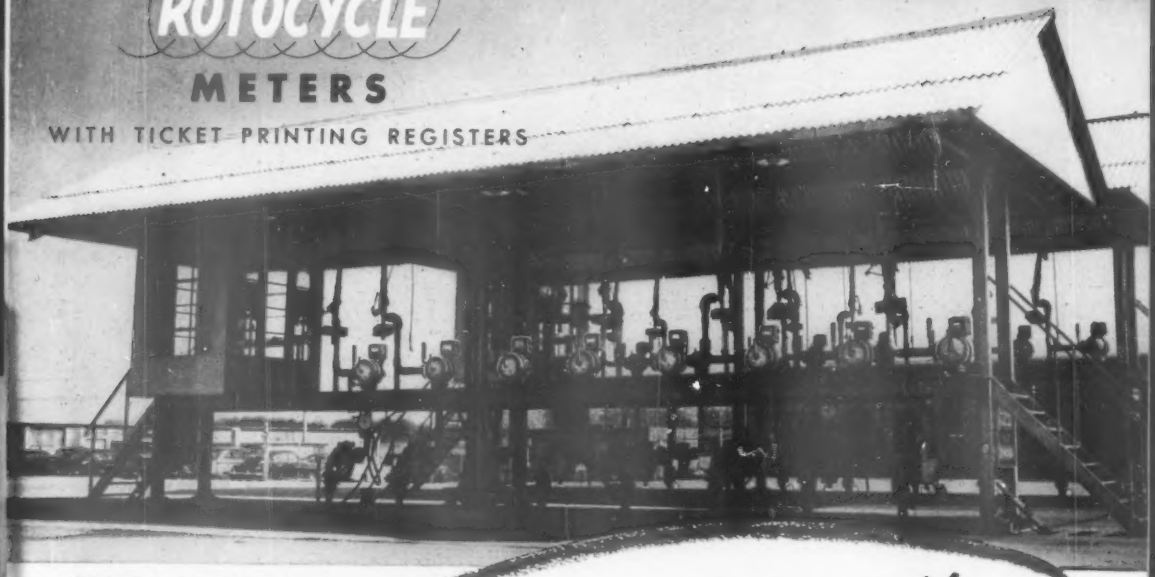
Name.....

Firm.....

Address.....

City.....Zone.....State.....

ROCKWELL
ROTOCYCLE
METERS
WITH TICKET-PRINTING REGISTERS



Twin loading racks on products pipeline terminal in Philadelphia. Model B-5 Rotocycles with printing registers are used.

It's on the Record!
. . . AND IN THE TRUCK

Model B-5 Rotocycle with ticket printing register. One of a complete range of sizes and types for every requirement.

At every transfer point in petroleum's path to market—on pipelines, loading racks and tank trucks—you can use ticket printing Rockwell Rotocycle meters with profit.

The unalterable, sealed in ticket is mechanically printed. It protects you against errors, doubts, and disputes which so often creep into fluid handling transactions. The customer gets a receipt . . . and you get a copy to simplify billing. You can gainfully use these printed records for inventory control.

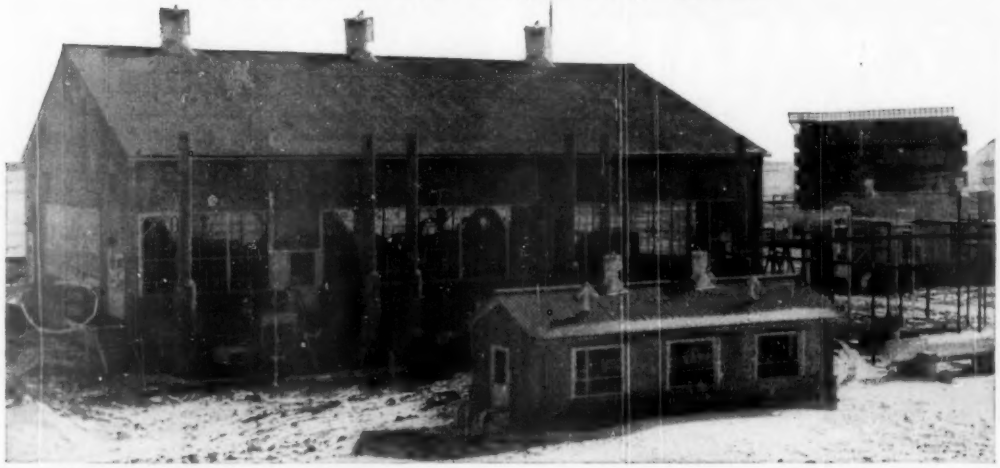
You get all *this* plus the proved accuracy and free "FLO-WARD" operation of Rockwell Rotocycle measurement. Write for literature and prices.

You Can RELY ON ROCKWELL

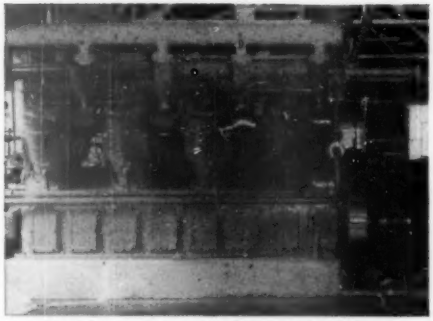
ROCKWELL MANUFACTURING COMPANY
PITTSBURGH 8, PA.

GRAVER CONSTRUCTION CO.

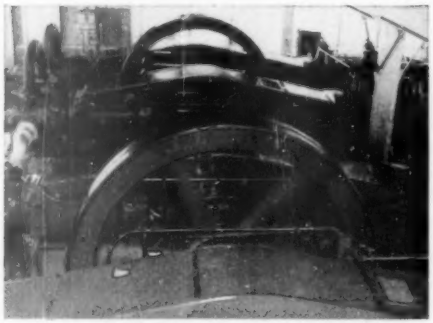
helps NORTHERN NATURAL GAS COMPANY reach new capacity goal



Compressor and fuel measuring buildings at Ventura, Iowa, Station.



Gas driven auxiliary engine in auxiliary building at Ventura, Iowa, Station.



Flywheels and compressor end of units in compressor building at Ventura, Iowa, Station.

Despite adverse weather conditions, Graver Construction Co. fulfilled its contract with the Northern Natural Gas Company and completed important enlargements of two Iowa transmission compressor stations in time for last winter's heating season.

These improvements included extensions to all the operating facilities of these stations. New buildings were constructed on new foundations; additional compressor units, gas scrubbers, and generators were set in place; new cooling towers were built and new control centers were equipped and placed in operation. Even heating units and water supply facilities were enlarged.

Northern Natural Gas Company supplies gas for 230 cities and towns along its 6,706 miles of pipeline from the Texas Panhandle to the Twin Cities. This extensive area of service includes both large manufacturing centers and a rich, progressive agricultural section. This area, rightly called the "Breadbasket of the Nation", has continued to demand ever-increasing supplies of natural gas. Last year, in furtherance of its plans, Northern succeeded in increasing its daily delivery capacity from 600 million to 675 million cubic feet per day. This greatly expanded capacity resulted, in part, from enlarged compressor stations built and equipped by the Graver Construction Co.

GRAVER CONSTRUCTION CO.

332 S. MICHIGAN AVE., CHICAGO 4, ILL.
NEW YORK HOUSTON

A DIVISION OF
GRAVER TANK & MFG. CO., INC.
EAST CHICAGO, IND.

Du Pont AMMATE®

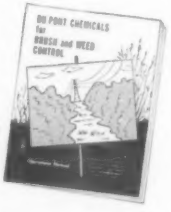
Keeps Brush Down with Fewer Sprays

Many users report lower cost to keep brush down with "Ammate" Weed Killer. Sprays once every five years do the job. For "Ammate" kills more kinds of brush, roots and all, than most other brush killers.

You save on labor and equipment with "Ammate." Each spray lasts longer, so maintenance crews can cover more ground. And "Ammate" provides top efficiency in killing brush over more months of the year than most chemicals.

Grass and low growth come back to control erosion, for "Ammate" does not leave soil unproductive. And since "Ammate" is not volatile, there's less danger of spray drift damage.

Get this illustrated booklet *describing industrial brush control with Du Pont "Ammate" and other Du Pont brush and weed killers. Write to Du Pont, Grasselli Chemicals Dept., Wilmington, Delaware.*



New Du Pont 80% CMU

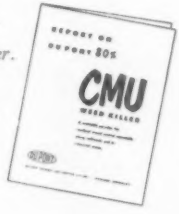
Keeps Ground Bare of Vegetation

Now you can reduce fire and maintenance hazards! New Du Pont 80% CMU Weed Killer destroys grass and broadleaf weeds . . . keeps weed growth out of tank farms, pumping stations, above-ground piping and other outdoor installations. And one application does the job for as long as a year or more.

This effective new chemical weed killer is absorbed by the roots, and gives thorough results. Tests throughout the U.S. and Canada have proved the effectiveness of CMU Weed Killer.

Du Pont CMU has other advantages, too. It is non-volatile, so there's less danger of spray drift damage, and, furthermore, it is non-flammable.

Get this new leaflet *on uses of Du Pont 80% CMU Weed Killer. For details, write to Du Pont, Grasselli Chemicals Department, 5031 Du Pont Building, Wilmington, Delaware.*



DU PONT
REG. U. S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

THROUGH SNOW OR RAIN OR HEAT OR SAND . . .

On Guard!

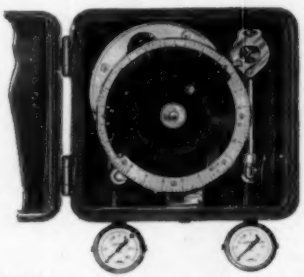
FISHER® INTERMITTERS

SPECIALLY DESIGNED FOR OIL FIELD PRODUCTION WORK, FOR INTERMITTENT GAS LIFT OPERATION OR INTERMITTENT FLOW CONTROL ON FLOWING WELLS.

THE NEW TIMING UNIT is housed in weather-proof, yoke-mounted case—has the inherent ruggedness so essential for satisfactory field operation. An economical unit.

NEWLY DESIGNED VALVE, specially designed for intermitter production control work. 2" screwed globe "Q" body, 1500 PSI cold working pressure.

THE NEW FISHER INTERMITTERS are designed and built with economy in mind. They provide both lower first costs with greater operating economy.



FEATURES:

1. Non-bleed pilot.
2. Minimum timing period 1½ minutes with 24-hour spring wound clock.
3. Large diameter wheel with movable clips for adjusting time cycle.
4. Easy replacement of parts subject to wear. No special tools needed.

FISHER

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

LEADS THE INDUSTRY IN RESEARCH FOR BETTER GAS PRESSURE CONTROL

"What do you do with all the money you make?"

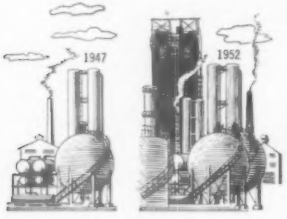
Standard's income *sometimes raises such comments as: "You people do a lot of business. You must be rolling in dough. What do you do with all the money you make?"*

The answer is a matter of public record. But in brief—after we've paid for materials, wages, employee benefits, and miscellaneous expenses . . . wear and tear on plants and equipment . . . interest on our long-term debts . . . and, in the last 5 years, more than $405,000,000 in taxes—then what's left, the "money we make," goes this way:

We invest in research and technical service — more than $35,000,000 in the last 5 years—to develop better ways of finding oil, increasing the yield, cutting costs, creating new business. That brings you new and improved products, with prices held down as we compete for your patronage.

Exploration here and abroad has cost us more than $229,000,000 in the last 5 years. Known crude reserves are at an all-time high. But these deposits were the easiest to discover. Though the earth holds vast hidden reserves, it now costs millions to find each new field, to assure continuing supplies.

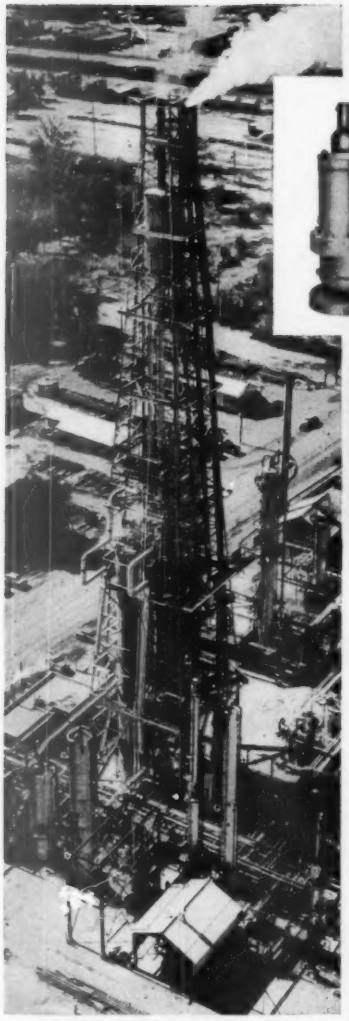
And finally, after setting aside funds for future operation, our more than 100,000 shareholders get what money remains—last year $2.60 a share, their return on savings invested in Standard. So almost all the "money we make" goes right back into circulation.



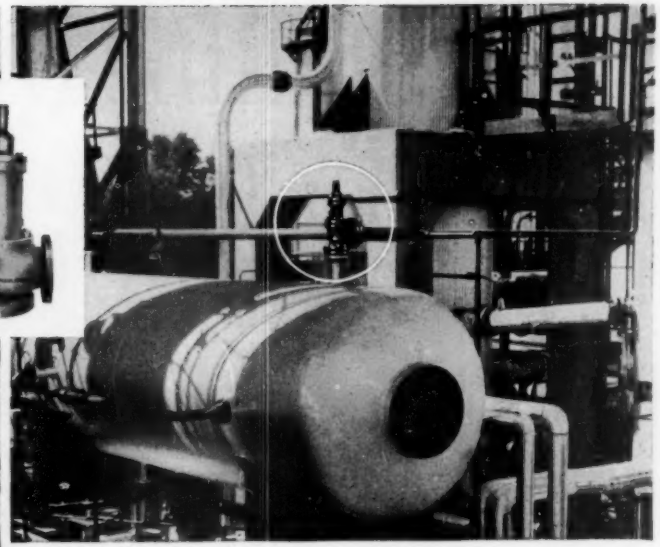
We put funds into facilities—in the last 5 years, more than $644,000,000. The need for oil products keeps growing. Standard must replace old wells, increase crude production; add to the capacity of refineries, pipelines, tankers, and all other things we need to serve you well.

STANDARD OIL COMPANY OF CALIFORNIA

• plans ahead to serve you better



Packaged TCC Unit, engineered and erected by Southwestern Engineering Company in cooperation with Socony-Vacuum Oil Company, Inc., licensor of the TCC process. It provides highly efficient production facilities for the independent refiner with up to 12,000 barrels per stream day crude oil capacity.



Consolidated Safety Relief Valve on wash water settler –one of the 42 installed on the TCC Unit.

WORLD'S FIRST PACKAGED TCC UNIT

Protected

BY 42 CONSOLIDATED

SAFETY RELIEF VALVES

A few months ago, the first packaged Thermofor Catalytic Cracking Unit went on stream at the New Mexico Asphalt & Refining Company, Artesia, New Mexico.

To protect the new facilities against overpressures, Consolidated Safety Relief Valves are used throughout the TCC feed preparation unit, catalytic section, gas recovery and catalytic polymerization plants.

Consolidated Safety Relief Valves were chosen for their absolute dependability. Outside bevel seat and floating guide construction eliminate leakage under discharge piping stresses. The disc moves on a radial seating surface—complete tightness is assured in all positions within the deflection range, under all service conditions. 25% fewer parts simplify servicing, minimize standardization problems, reduce maintenance costs. Continuous performance is certain at the rated capacity.

The packaged TCC Unit meets the nation's urgent need for increased gasoline yield and improved anti-knock ratings. The installation of Consolidated Safety Relief Valves safeguard life, property and continuous production. Your local distributor will gladly tell you all about them.

CONSOLIDATED SAFETY RELIEF VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** TULSA, OKLAHOMA

MAKERS OF 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

Cummins® Diesels
do so many jobs - so much better

Shovels, cranes, industrial locomotives

Drilling rigs, centrifugal pumps, generator sets

Buses and on-highway trucks

...because they're custom-built to fit the job

Earthmovers, logging yarders and loaders

Off-highway trucks, crawler tractors

Work boats, pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

---

...because they're

BUILT NOT ONCE BUT TWICE

Rugged, lightweight, high-speed Cummins Diesels are at work everywhere. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. This extra care in building, plus Cummins exclusive fuel system and an efficient and expanding service and parts organization, means minimum "down time", more power and profits for the user. See your Cummins dealer.

CUMMINS Industrial DIESEL

TRADEMARK REG. U. S. PAT. OFF.

Diesel power by CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U.S.A. • Cable: Cumdiex

MOVING TOWARD MINNEAPOLIS...

Goes Another Republic Electric Weld Pipe Line

150 miles of 12¾" Republic Electric Weld Line Pipe make up the first leg of this Tulsa-to-Minneapolis gasoline line.

That's the pipe with uniformly round ends that *match perfectly.* Uniform diameter *speeds field welding.* Low carbon steel *welds readily.* Uniformly straight lengths *line up evenly.* Long lengths *reduce number of joints.* High ductility steel *simplifies field bending.* Uniform high yield strength permits building *higher pressure lines.* Uniform wall thickness means *dependability in every inch.* Freedom from scale *protects against clogged valves.*

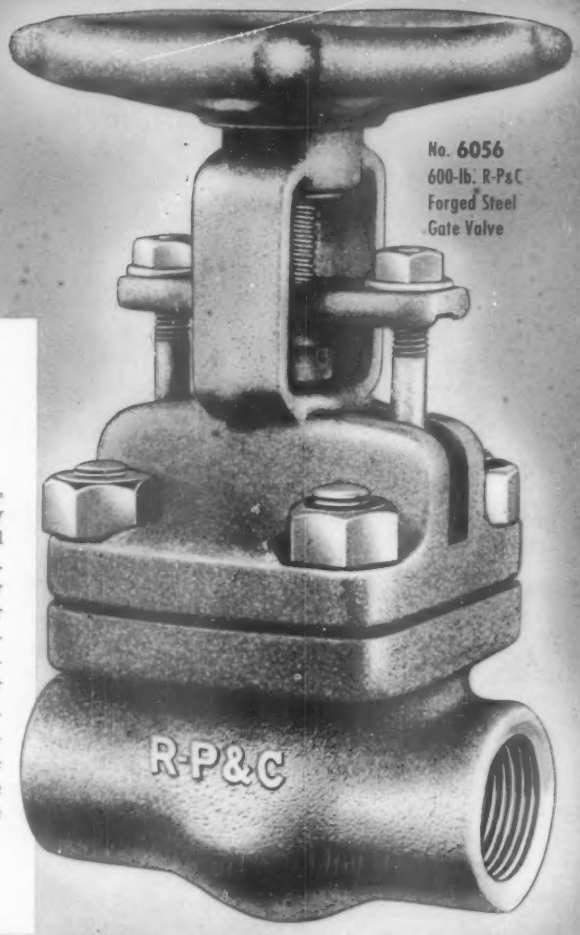
During the past 23 years, more than 63,000 miles of Republic Electric Weld Line Pipe have been placed in service in transmission, distribution, collecting and product lines. That's convincing proof of its dependability. Write for literature.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic
REPUBLIC STEEL
ELECTRIC WELD LINE PIPE

Other Republic Products Include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

an ACCO product



No. 6056
600-lb. R-P&C
Forged Steel
Gate Valve

Premium Quality Features

• Body, bonnet, yoke, wedge, and hand-wheel of this sturdy R-P&C Gate Valve are forged steel. Wedge is heat-treated. Seating surfaces are smoothly ground and chromium plated for near diamond hardness. Stainless steel swinging gland eyebolts and nuts won't corrode or freeze. Furnished in ¼" to 2" sizes. Screwed, flanged, or welded end.

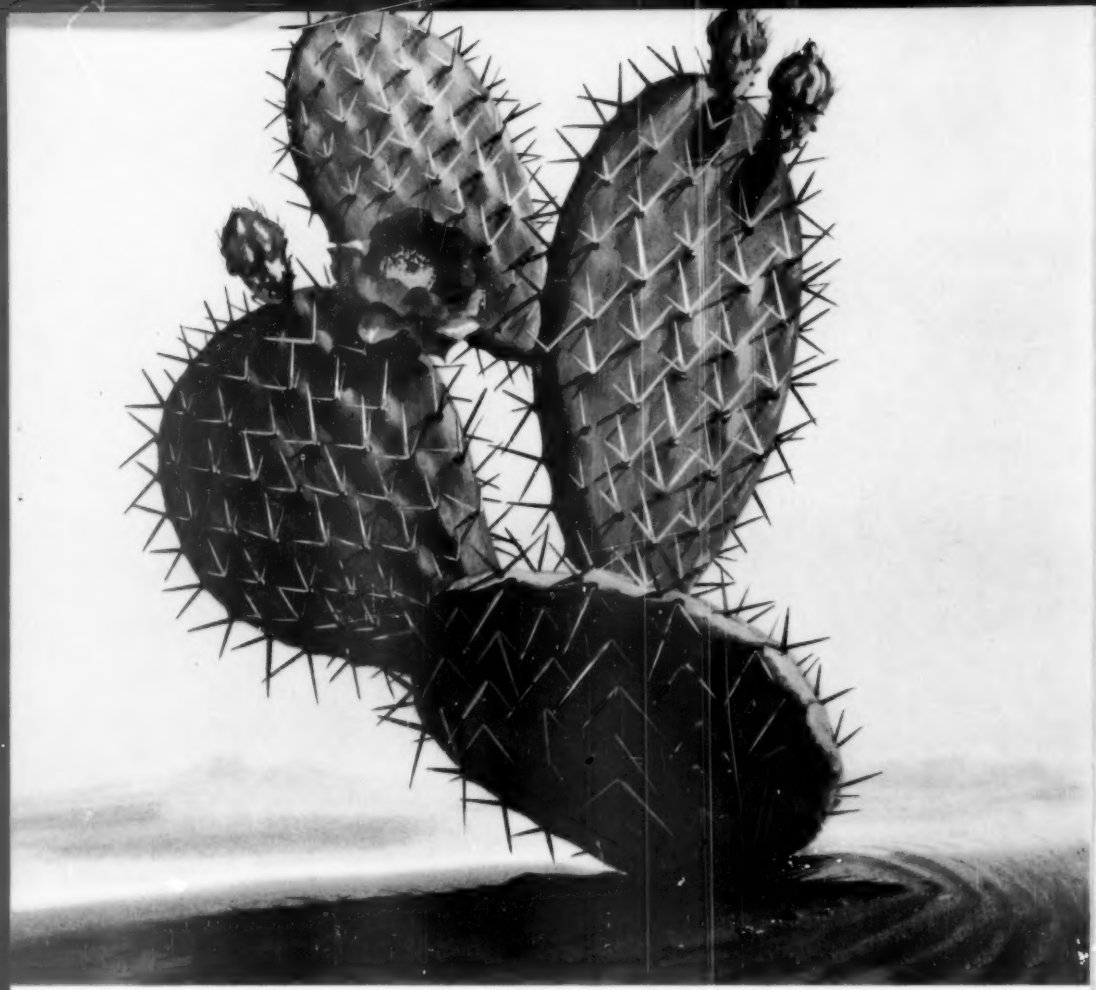
It's a premium quality valve but NOT premium priced. See your R-P&C distributor or write nearest R-P&C district office.

R-P&C valves

ACCO
TRADE MARK

R-P&C VALVE DIVISION
AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Baltimore, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



What is the most important point about our new Texas plant?

It probably would be more usual to announce the opening of Ethyl's new Texas plant by showing a large air view of the entire layout. However, this close-up of another kind of Texas plant better illustrates our point.

You see, the plant in the picture above is completely self-sustaining. Just give it sunlight, air, a little water, and a place to grow. It depends only upon raw materials to make the complex chemicals it needs to stay in business. In other words, it is a *completely integrated* plant . . . just like the new Ethyl plant at Houston, Texas.

Give Ethyl's new Texas plant the raw materials—such as pig lead, salt, petroleum gases, electricity—and it can make all the chemical ingredients needed in "Ethyl" antiknock compound. In this way the new plant is like Ethyl's plant

(*continued on next page*)

What is the most important point about our new Texas plant?

(*continued from preceding page*)

at Baton Rouge. Each is completely integrated—and is independent of the other.

We think this integration is an extremely important point to refiners. Today refiners are faced with the challenge of supplying great quantities of high-quality gasoline to meet the ever-increasing demands of American transportation. To perform this service, they need an uninterrupted supply of antiknock compound —which an *integrated* plant is best able to give them.

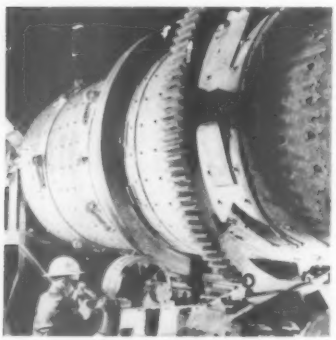
With the construction of Ethyl's new Texas plant, such a reliable source of antiknock compound is now assured. The new plant is engineered for highest efficiency. Raw materials are available nearby. Electric power supplies are ample. Six railroads out of Houston give Ethyl wide choice in routing antiknock compounds to Ethyl customers throughout the country. And, perhaps most important, this new plant has expanded facilities to a point where "Ethyl" antiknock compound manufacturing capacity is now more than ample to meet demand in the foreseeable future.

ETHYL CORPORATION

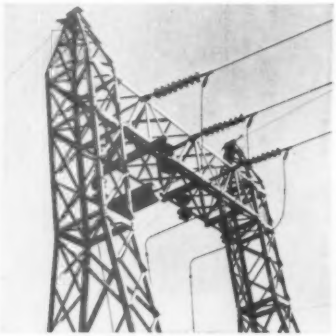
NEW YORK 17, NEW YORK

Ethyl service is backed by 29 years of antiknock experience

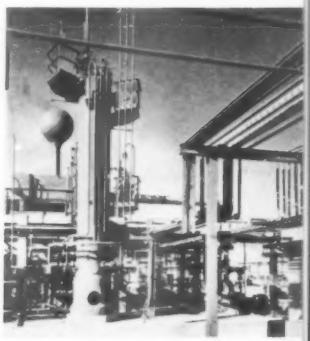
HERE ARE A FEW OF THE MANUFACTURING UNITS IN OUR NEW TEXAS PLANT



A SALT DRYER IN THE SODIUM BUILDING



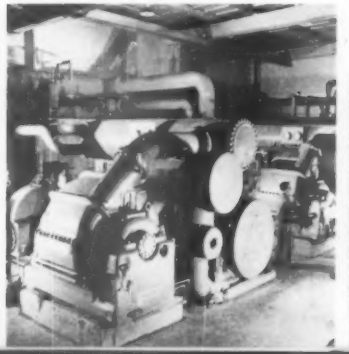
HIGH-VOLTAGE LINE FOR SODIUM CELLS



THIS IS THE ETHYL DICHLORIDE PLANT

THE ETHYL CHLORIDE UNIT IS A PLANT IN ITSELF

REFRIGERATION CO[illegible]ORS IN THE ETHYL CHLO[illegible]UNIT



TETRAETHYLLEAD MANUFACTURING BUILDING

Century 30 horsepower Drip Proof Motor on a pumping unit.

Century Oil Industry Motors'

RUGGED CONSTRUCTION

Keeps Them on the Job— Day After Day After Day

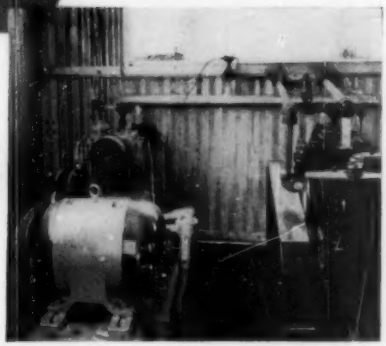
Century Motors are deliberately built to meet the unlooked for conditions. They will stand up under tough 3-shift continuous operation, when necessary. You'll find Century Motors giving satisfactory service in oil fields throughout the world.

FOR OIL PRODUCTION: Century Splash Proof Motors are widely used on outdoor installations such as pump rigs. Type SCT high torque, high slip motors start stiff pumps easily—and minimize shock reaction to pump parts.

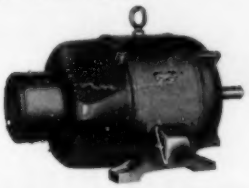
FOR REFINING AND DISTRIBUTION: Century "Underwriters' Approved" Explosion Proof motors protect life and property in explosive atmospheres.

Century Motors are available in a complete range of types, in sizes from 1/8 to 400 horsepower. For complete information, see your nearest supply store—or Century branch office.

Century C MOTORS



Century 5 horsepower capacitor type Explosion Proof Motor on an air compressor in a gas repressuring plant.



CENTURY TYPE ARC GENERATORS

Where public service current is not available, Century Generators will provide adequate, continuous electric power. Depending on the load per motor and the size of generator, from 10 to 30 wells can be operated from one generator. They provide a dependable source of oil field power.

CENTURY ELECTRIC COMPANY • 1806 Pine St., St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

CE-738

HYDRATROL LATHES

LARGE HOLLOW SPINDLE TYPE

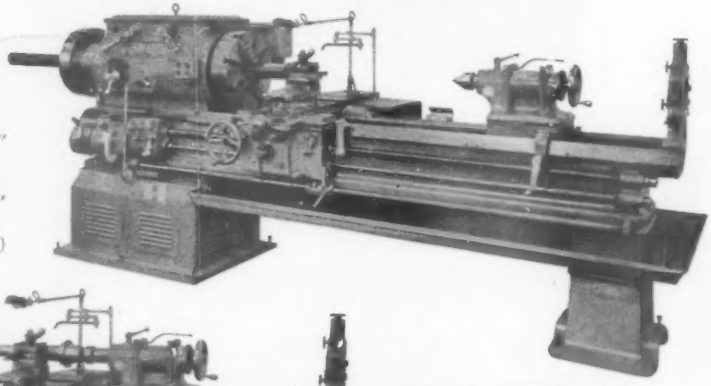
Check These 3 Points of... versatility

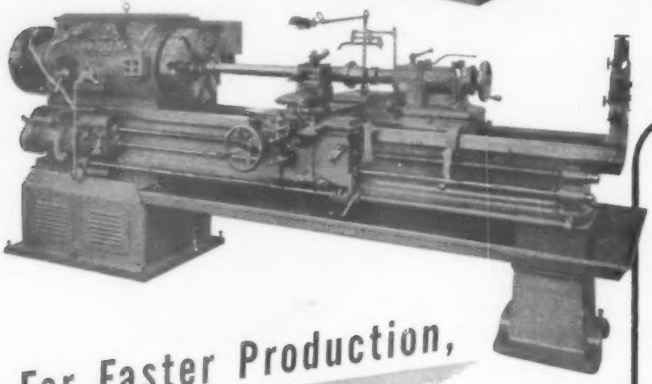
1. Machine long work chucked through spindle.
2. Machine work between centers.
3. Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

Both Illustrations Show the 18" Hollow Spindle 7⅛" Hole

SIZES 18" TO 36"

Small — 18" & 20" up to 7⅛" Hole
Medium — 25" up to 12" Hole
Large — 32" & 36" up to 16⅛" Hole
(Standard Type Lathes 16"-36")





IMPORTANT FEATURES

Timken Bearing Spindles.

Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

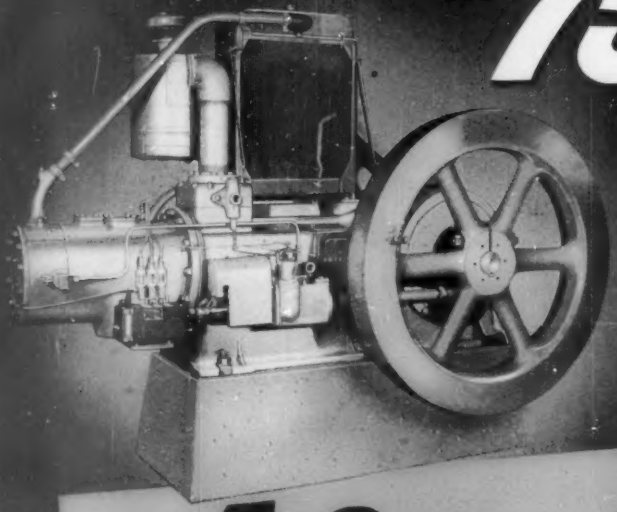
For Faster Production, Better Work, Lower Costs!

LEHMANN MACHINE COMPANY

CHOUTEAU AT GRAND • SAINT LOUIS 3, MISSOURI

Another Forward Step

75 Ajax



THE Ajax 11" x 14"

Type CMD GAS AND OIL ENGINE

The new Ajax 11" x 14" Type CMD Gas and Oil Engine provides greater power, flexibility and smoothness than ever before available in a pumping engine of this size, with many special features included as standard equipment. • Investigate the remarkable capacity of this husky Ajax "big boy" to handle your tough pumping requirements. See your Supply Man—now!

LEADERSHIP
1877 1952
Ajax
GAS AND OIL ENGINES

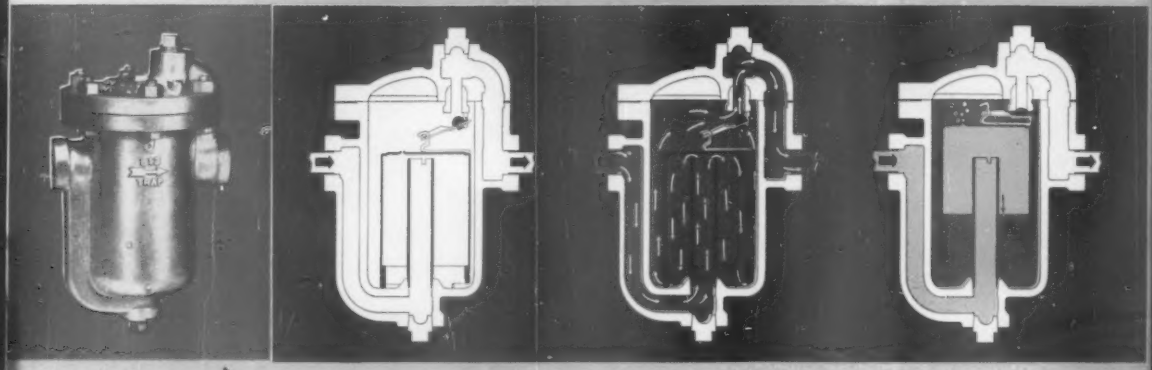
AJAX IRON WORKS

Manufacturers of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., TOLEDO, OHIO
R. B. MOORE SUPPLY CO., INC., BOLIVAR, N. Y. - BETHLEHEM SUPPLY CO., TULSA, OKLA.

ARMSTRONG TRAPS are



A WORKING PICTURE OF ARMSTRONG DESIGN

1. When trap is first installed, the inverted bucket is down and the valve is wide open.

2. When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until . . .

3. steam (light color) reaching the trap floats the inverted bucket and closes the valve.

THE highly efficient design of modern Armstrong traps directly reflects over 40 years' experience in inverted bucket trap manufacture and application gained since Armstrong developed the first practical inverted bucket trap in 1911.

Armstrong design offers:

- A "frictionless" leverage system which combines high leverage with wide opening of a large orifice.
- A minimum of parts.
- Strong, corrosion-resistant and wear-resistant materials.
- Generous margins of safety.

For trap users this means:

- Large capacity.
- Dependable service under adverse operating conditions.
- Low maintenance.
- Continuous operation of heating and process equipment.

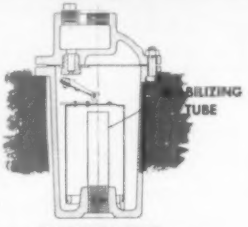
The soundness and benefits of Armstrong design have been proved in thousands and thousands of plants all over the world. To insure dependable condensate drainage for a new plant or plant expansion, simply specify: "Traps shall be Armstrong." For additional information, call your local Armstrong Representative or write:

ARMSTRONG MACHINE WORKS
880 Maple St., Three Rivers, Michigan

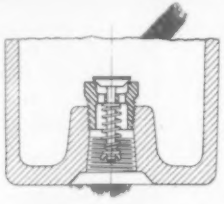
SELF-SCRUBBING ACTION (see Fig. 2 above). Note that condensate first flows down *between bottom of bucket and trap body*, then up and out through orifice. The high velocity flow under bottom of bucket keeps dirt in suspension, washes it out when trap opens. No dirt problems with Armstrong design.

BUCKET FLOATS WHEN LESS THAN ⅔ FULL OF STEAM (see Fig. 3 above). The generous margin of safety (dimension A in Fig. 3 above) insures that the bucket will float with trap body partly full of water. A heavier bucket would give more power but it might not float and close the valve.

SOME OTHER ARMSTRONG



STABILIZING TUBE
Condensate, air and steam are admitted above water level in trap bucket. The water level is undisturbed, eliminating wear-producing agitation of the bucket, valve lever and valve. This exclusive feature greatly lengthens life of working parts.

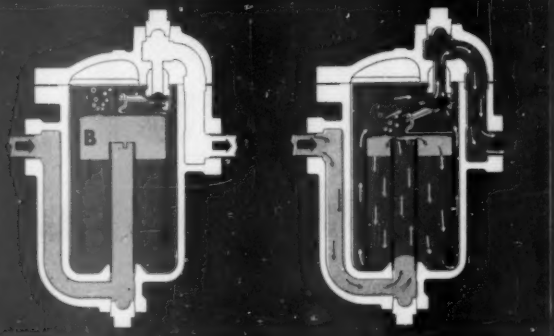


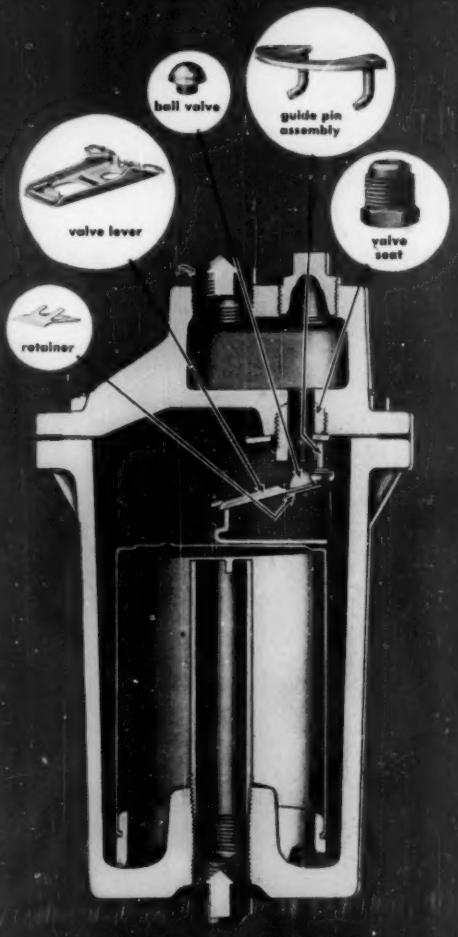
INTERNAL CHECK VALVE
All Armstrong traps can be equipped with the Armstrong spring-loaded stainless steel check valve. Costing less than an external check valve, it also saves installation labor and fittings.

ARMSTRONG "INVERTED BUCKET" STEAM TRAP

ARMSTRONG

Designed to give better Performance!





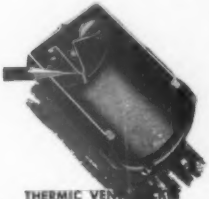
4. When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.

5. When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.

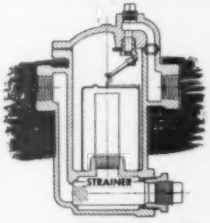
NO AIR BINDING (see Fig. 4 above). Air mixed with steam passes through the bucket vent, collects at top of trap and is discharged ahead of condensate. The large air-handling capacity of Armstrong traps insures top equipment temperatures and faster heat-up.

EXCESS POWER PROVIDED FOR OPENING TRAP (see Fig. 5 above). Weight of bucket times leverage opens trap. Here again Armstrong design provides a generous safety margin. Reducing dimension B in Fig. 4 would increase power of bucket but margin between test opening pressure and operating pressure would be too low to allow for normal wear and for pressure fluctuations.

TRAP DESIGN FEATURES



THERMIC VENT BUCKET
Where large amounts of air must be discharged when steam is turned on, and where air can be pushed out ahead of incoming steam, this bucket will speed heat-up greatly. The vent is open when trap is cold, closes at 210° F. Has 50 to 100 times air handling capacity of standard buckets.



INTEGRAL STRAINER TRAPS
The two smallest sizes of Armstrong traps, most apt to need strainer protection, are available in a body style having the strainer built right in. The strainer can be cleaned while trap is operating.

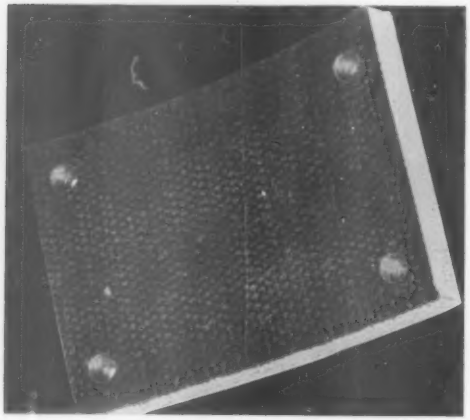
SEND FOR NEW
44-PAGE STEAM TRAP BOOK

Complete data on Armstrong trap design and operation; physical data and list prices; capacities; selection, installation and maintenance recommendations. Free on request.

STEAM TRAPS

"Brake Problems?"

NOT ANY MORE! WE'RE USING



RAY-MAN 635-D BLOCKS

Want brake blocks that will feed off smoothly even when handling the heaviest strings of pipe . . . won't carbonize when overloaded . . . won't glaze drums?

Get Ray-Man 635-D Brake Blocks! They're woven of unusually large asbestos yarns, fully impregnated even in the middle of the block. They're strengthened with brass-wire-reinforced yarn in back. They resist bleeding even at high temperatures . . . and they'll certainly give you a new idea of *durability* in brake blocks!

Key-Lok Attachment. Ray-Man 635-D Blocks are available either drilled and countersunk for bolt attachment, or specially prepared for Key-Lok . . . the R/M development that makes it possible to *slide* blocks on and off.

Key-Lok saves relining time. Eliminates bolt holes, too, thus providing greater friction surface and longer wear. No danger of scoring drums with bolt heads!

RAYBESTOS-MANHATTAN, INC.

WAREHOUSE STOCK: 2809 Taylor Street, Dallas, Tex.

OFFICES:

445 Lake Shore Drive, Chicago 11, Ill. • 4651 Pacific Blvd., Los Angeles 11, Calif.

Factories: **Bridgeport, Conn. • Manheim, Pa. • Passaic, N.J. • No. Charleston, S.C. • Crawfordsville, Ind. Peterborough, Ontario, Canada**

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Radiator Hose • Fan Belts • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

RM

PEERLESS BUILDS *Dependable* PUMPS

PEERLESS PUMPS

USE THE VERTICAL HYDRO-LINE PUMP WHERE YOUR APPLICATION REQUIREMENTS ARE:

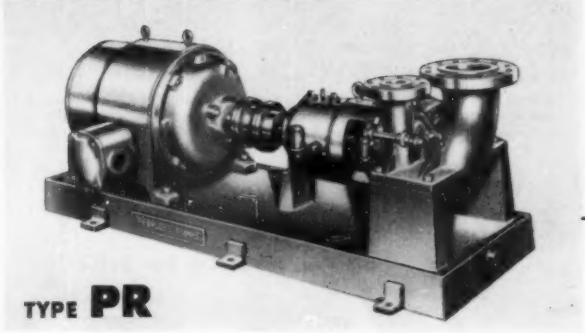
Low System NPSH; Moderate Capacities; High Pressures; High Temperatures; Extreme Installation Flexibility; Optional Mechanical Shaft Seal or Packing Gland Construction; Economical Service and Maintenance; Operational Dependability; Wide Range of Liquid Pumping Services, such as Condensate, Hydrocarbons, Hot or Cold Water, Mild Salt Solutions. For descriptive Bulletin No. B-592, check and mail coupon.

USE THE HORIZONTAL TYPE PR PUMP WHERE YOUR APPLICATION REQUIREMENTS ARE:

Rugged Center-Line-Mount Construction; High Temperatures; High Pressures; High Capacity; Extra Low NPSH Requirements; Optional Use of Mechanical Shaft Seal or Packing Gland Construction; End or Top Suction Design; Dependable Performance with Minimum Maintenance; Availability in Various Alloys; A Complete Range of Sizes; Maximum Parts Interchangeability; Wide Range of Liquid Pumping Services, such as Hot Oil, Butane, Propane, Hydrocarbons, Hard-to-Handle Chemicals and Water. For descriptive Bulletin No. B-1605, check and mail coupon.

VERTICAL

HORIZONTAL



TYPE **PR**

SELECT FROM

the complete Peerless line. Pumps for every liquid service. Scores of Vertical & Horizontal designs, and hundreds of models available. Nationwide engineering and application service. Plan with Peerless for all your needs for pumps.

MAIL COUPON TODAY

PEERLESS PUMP DIVISION
Food Machinery and Chemical Corporation
301 West Avenue 26
Los Angeles 31, California

Please send us a copy of the following bulletins:

☐ VERTICAL HYDRO-LINE PUMP ☐ HORIZONTAL TYPE PR PUMP

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____

O & GJ

PEERLESS PUMP DIVISION
Food Machinery and Chemical Corporation
Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
OFFICES: New York; Chicago; St. Louis; Atlanta; Tulsa; Dallas, Plainview and Lubbock, Texas; Fresno, Los Angeles, Calif.; Phoenix; Albuquerque, New Mexico

PEERLESS PUMPS fmc

Engineers

TO THE PETROLEUM INDUSTRY

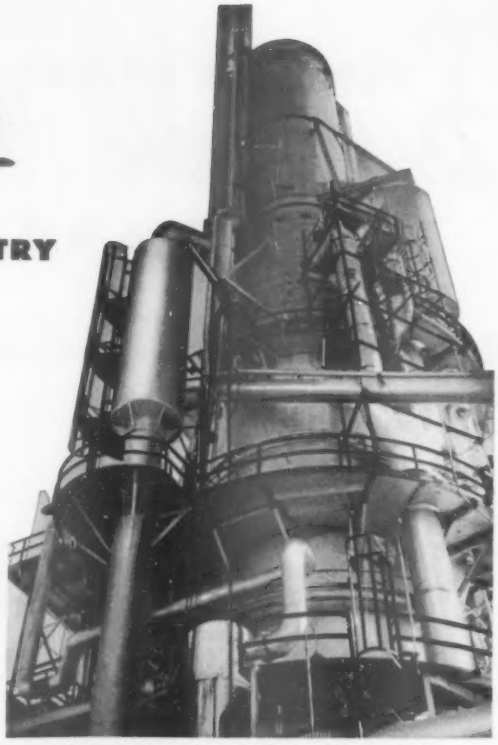
- *Specialists in Surge Control in Gas and Air Piping*
- *Leaders in Engine and Compressor Noise Reduction*

CONSULT BURGESS-MANNING ENGINEERS

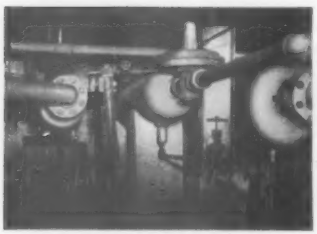
As originators of the Snubbing Principle to reduce noises from engine exhausts and compressor intakes and a pioneer in surge control in gas and air piping, we are capably qualified by a quarter century of broad experience to serve you. Continuous, intensive research to improve the design of our Snubbers and diligent study of thousands of Burgess-Manning Snubber applications has kept us abreast of the tough, new operating problems in engine and compressor noise restriction and surge control confronting the petroleum industry. Consult Burgess-Manning, today: Sound engineering counsel, reliable Snubber design, a product manufactured to exacting specifications, guaranteed Snubber performance. Write for literature.

BURGESS-MANNING COMPANY

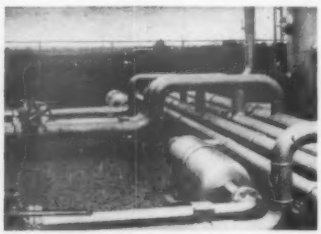
1203 Dragon Street, Dallas, Texas



FLUID CATALYTIC UNIT—A large size Burgess-Manning Snubber installed on flue gas blow off from regenerator on fluid catalytic unit of a Texas petroleum corporation.



SURGE CONTROL—Gas and Air Line Snubbers installed on the discharge of the first and high stage of a compressor.



GAS BOOSTER STATION—Burgess-Manning Snubbers installed in the high pressure discharge lines in a gas booster station.

GASOLINE PLANT — Burgess-Manning Exhaust Snubbers installed on 600 hp engines in an Oklahoma gasoline plant.

From well head through the refinery gate

...it's Burgess-Manning

Write for Bulletins

INSTALLATIONS

- Stationary and portable internal combustion engines
- Steam discharge
- Positive displacement and reciprocation vacuum pump discharge
- Compressors, blowers

PETROLEUM APPLICATIONS

Oil and gas production • oil and gas well repressuring and recycling • gas transmission • gas distribution • natural gasoline industry • manufactured gas industry • petroleum refining • petrochemical process industry • drilling • oil well pumping • crude oil and product pipe lines • chemical industry • all industries handling air, steam, refrigerants.

"U.S. Royal 4 all the way... use it from spud to pay!"

says "Red" Royal

And he is right! Why? Because U.S. Royal 4 Rotary Hose is the strongest and best hose in the oil field. It is stronger because it has 2 double wire layers—each a hose in itself.

U.S. Royal 4 is flexible from nipple to nipple. Its special rugged wire reinforcement plus strong and balanced wall construction make a hose that can be used in ANY FIELD at ANY DRILLING PRESSURE.

And you know what that means... minimum "down time" resulting in real savings in time and money.

Proof? Check U.S. Royal 4's 2-year field-test results with your local U.S. Supply Store. You will find that Royal 4 has run up new service records from Gulf Coast to the Williston Basin.

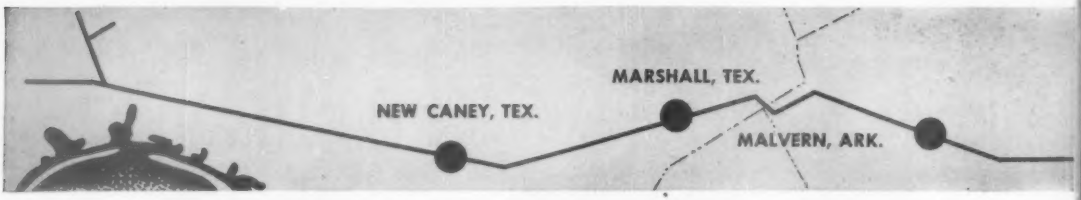
Developed by Science—Proved by Drillers

Available in all FIELDS at the BEST SUPPLY STORES

PRODUCT OF U.S. RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.



Texas-Illinois Compressors 100% Worthington

25 2000-horsepower engine compressors used in 5 stations on 1400-mile line

THE ORIGINAL GAS PIPELINE TO CHICAGO, built by the Natural Gas Pipeline Company of America in 1931 from the Texas Panhandle field to Joliet, Illinois, used 57 Worthington 1400-hp gas-engine compressors—all that were installed at that time. (Upper line on map.) Since 1931, 48 units were added; today a total of 105 units are operating on the line.

On Dec. 5, 1951, the valve turn-on ceremonies at Joliet, Illinois, initiated the flow of additional Texas gas to the Chicago Area.

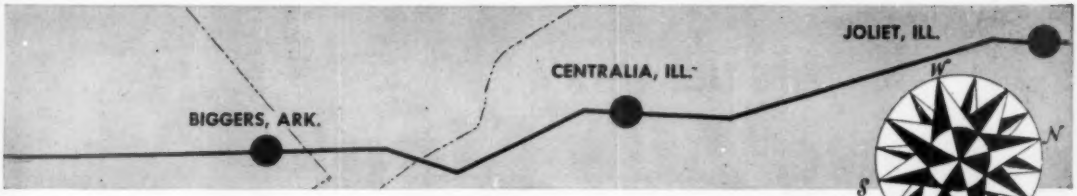
Along the new line—which will deliver 374,000,000 cu ft of gas daily—are twenty-five 2000-hp Worthington gas-engine compressors working in groups of five at stations from New Caney, Texas to Centralia, Illinois.

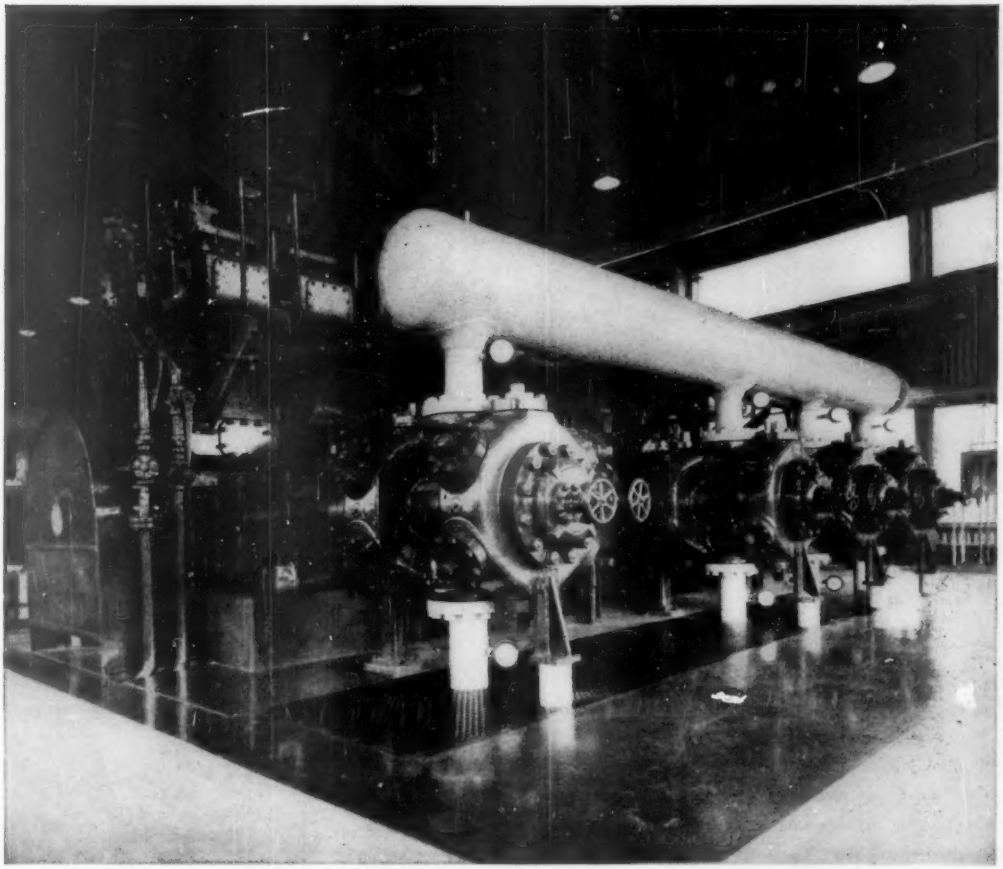
The 10-cylinder UTC-16 gas engines use Worthington's uniflo timed-scavenging method that assures a "clean-sweep" of burned gases and the smoother operation that goes with it.

Though designed primarily as a pipeline gas-engine compresor, the UTC-16 is suitable for many services including: pressure maintenance on oil wells . . . in natural gasoline plants . . . in oil refineries for solvent extraction, vapor recovery, recycling and stabilization of gases . . . in petro-chemical processing of products made from natural gas under pressure . . . and in many refrigeration applications.

The uniflo UTC-16 is built in sizes from 1000 to 2000 hp. If your process requires gas compression and you have a suitable gas available for fuel, the Worthington UTC-16 will do a better job for you. For complete information contact your nearest Worthington District Office or write Worthington Pump and Machinery Corporation, Engine Sales Division, Buffalo, N. Y.

NO OTHER COMPRESSOR WILL





WORTHINGTON 2000-hp 10-CYLINDER ENGINE-COMPRESSORS at New Caney, Texas, station of the new Gulf Coast-Chicago pipeline of the Texas-Illinois Natural Gas Pipeline Company. These engines use Worthington's uniflo thru-scavenging system—a design thoroughly proved by years of research by Worthington.

PORTABLE COMPRESSORS

RADIAL

GAS ENGINE COMPRESSORS

OUTPERFORM A WORTHINGTON

WORTHINGTON

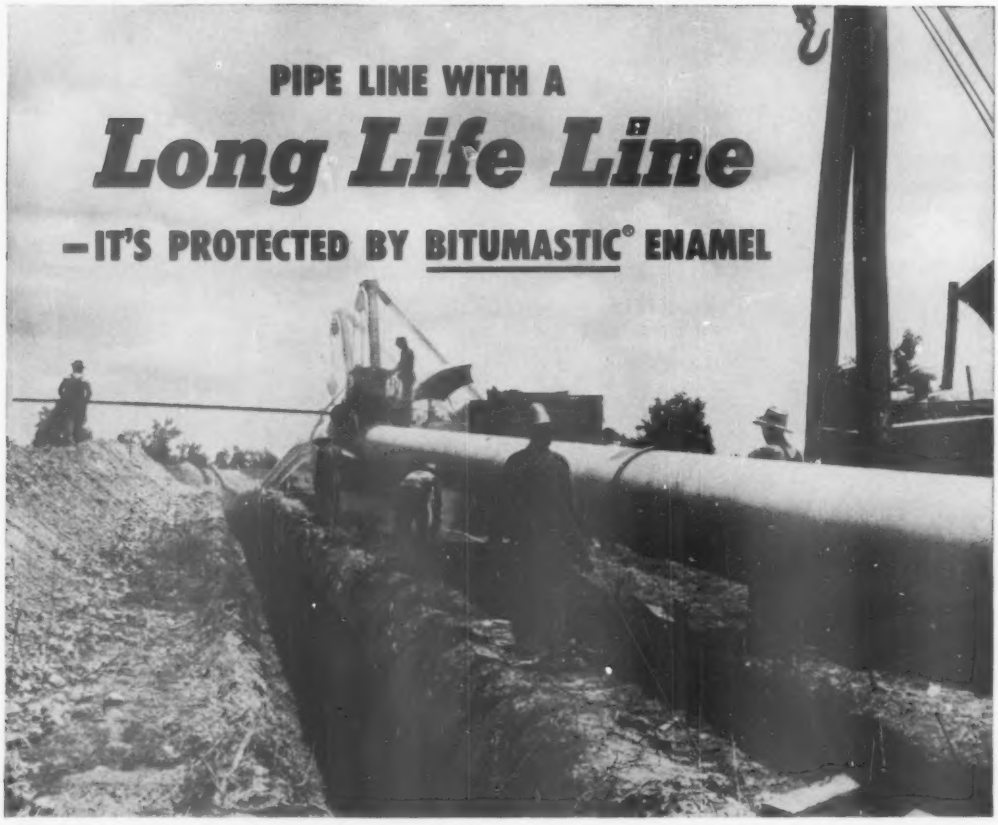
Engine Compressors

BK.2.1

PIPE LINE WITH A

Long Life Line

—IT'S PROTECTED BY BITUMASTIC® ENAMEL



This pipe line was coated with Bitumastic Enamel—then wrapped.

HERE's a steel pipe line that's almost completed. And once in service, this line will *stay* in service because it's protected by Bitumastic Enamel against severe corrosive conditions.

Bitumastic Enamels give pipe lines the best possible protection against all kinds of corrosion. Here's one reason: through the years these coal-tar enamels *keep* moisture away from pipe-line surfaces, thus preventing corrosion. Two more reasons: these durable enamels don't disintegrate with age; they are chemically resistant to soil elements.

Because of Bitumastic Enamels, many oil and gas pipe lines laid 20 and 30 years ago are still giving good service today. Specify Bitumastic Enamels for your next pipe-line project, and give it the same effective protection. Your Koppers representative will give you complete details and estimates.

Bitumastic Enamels soon available from Koppers new California Plant!

As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the West.

KOPPERS BITUMASTIC ENAMELS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 503-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

✓CHECK and ✓✓DOUBLE CHECK with the

. . . EASTCO SELF-CHECKING MECHANICAL DRIFT INDICATOR

There are other drift indicators, but Eastman, and only Eastman makes one to DOUBLE CHECK itself (2 readings) with a 40-second interval between.

No batteries, light bulbs or photo sensitive discs are used. The Eastco Self-Checking Drift Indicator is COMPLETELY MECHANICAL.

This instrument is the smallest drift indicator on the market. It can be go-deviled or lowered into the hole on any conventional line.

Operators may contract for this instrument on a daily or term rental basis at a nominal charge. Call the nearest Eastman office for details and a demonstration.

Here is reproduction of drift indicator disc, actual size, showing both recordings 4½° off vertical.

EASTCO
Self-Checking Mechanical Drift Indicator

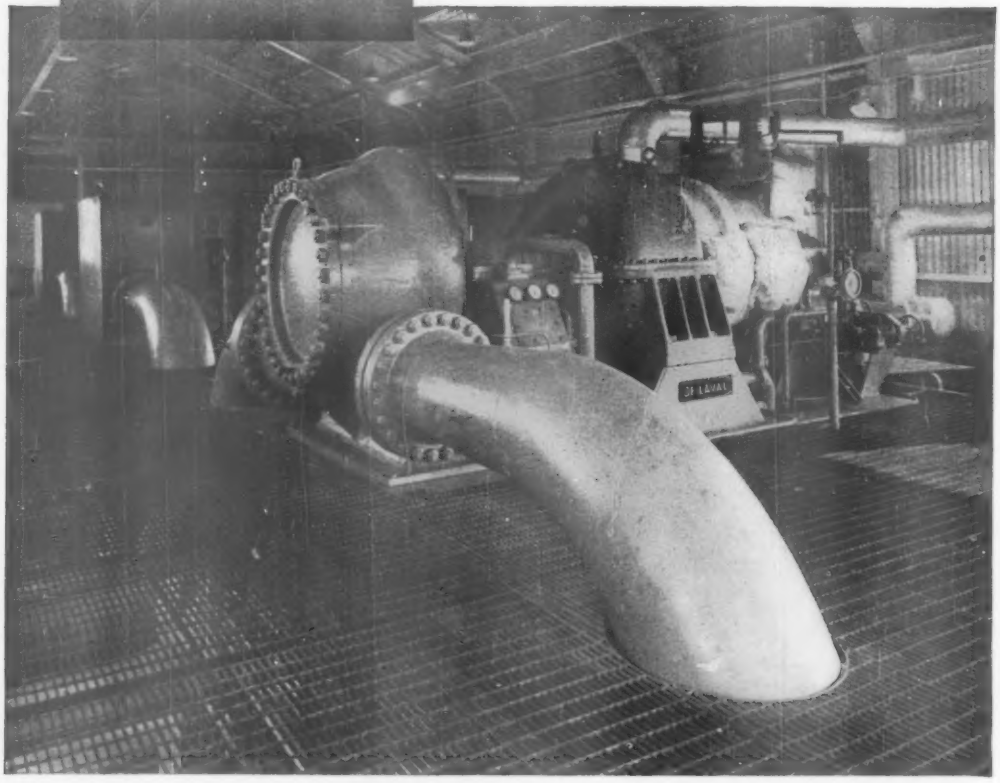
22 offices for your convenience — Consult your Telephone Directory

Eastman
OIL WELL SURVEY COMPANY
LONG BEACH · DENVER · HOUSTON

Export Sales and Service: EASTMAN INTERNATIONAL COMPANY
P. O. Box 1500 • Denver, Colorado

DE LAVAL
CENTRIFUGAL
COMPRESSORS

on the job at Transco



Today's modern, long-distance, high pressure gas transmission lines can't afford weak links. That's why the Transcontinental Gas Pipe Line Corporation selected these three efficient De Laval 5,000 hp steam turbine-driven centrifugal compressors for their Tylertown, Mississippi station.

There are sound reasons for their selection. The De Laval high pressure shaft seal eliminates leakage. Consumption of sealing oil is negligible. There is only one moving part—the rotor, which has ample clearances. These units are also compact, require smaller foundations and smaller stations. What's more, first cost and installation costs are low.

If a careful study of your needs indicates that centrifugal compressors are practical from an economic standpoint, it will pay you to consult our engineers. They can give you the benefit of our practical experience on all four of this country's major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
Trenton 2, New Jersey

DL184

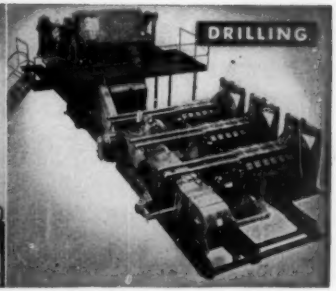
when time is money!

Drillers and production men look to

ENSIGN CARBURETION

for DEPENDABLE low cost

GAS ENGINE PERFORMANCE

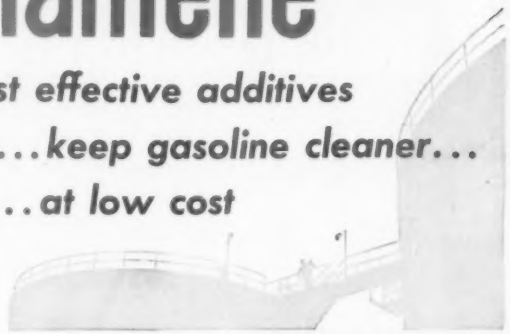


ENSIGN
CARBURETOR COMPANY
Dealers and Distributors in All Principal Oil Fields

7010 SO. ALAMEDA ST., P.O. BOX 229, HUNTINGTON PARK, CALIF. • BRANCH FACTORY: 2330 W. 58TH ST., CHICAGO 36, ILLINOIS

Tenamene

the most effective additives known . . . keep gasoline cleaner . . . longer . . . at low cost



WHAT IS GUM? Gum is a non-volatile material resembling varnish or lacquer. Soluble in gasoline, gum separates only when gasoline evaporates, unless highly concentrated. Sometimes gum settles as a heavy, dark-brown oil. The enemy of engine efficiency, gum coats carburetors, plugs jets and screens, and causes valves to stick.

WHAT INHIBITORS DO. Commercial gasoline inhibitors retard oxidative deterioration, the first step in gum formation. To prevent storage loss, inhibitors should be soluble in gasoline but not in water. They should not color gasoline and should resist darkening.

THE TENAMENES — EASTMAN INHIBITORS. For years Eastman has made the most effective gum inhibitors known—Tenamene 1 and Tenamene 2. Formerly these were sold through another company under another name. Now Eastman makes them available directly and from convenient stocks. Choice between the two gum inhibitors depends on a number of factors, such as the crude, the treatment and possible caustic carryover. Tenamene 2 should be used where traces of caustic are present. Where caustic is not present, choice must be based on such tests as ASTM Gum, Oxygen Bomb or Copper-dish Gum. Since Tenamene 2 is more concentrated and non-inflammable, its slightly higher cost is frequently more than offset by lower shipping costs.

FOR MOTOR FUELS. Tenamene 1 is a mobile, tan liquid composed of 48% N-n-butyl p-aminophenol in isopropanol. 5 to 52 lbs. per 1000 bbls. inhibit gum in most motor fuels, protect dyes from fading, and retard tetraethyl lead decomposition.

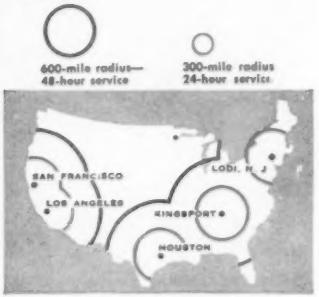
FOR MOTOR FUELS AND ALL AVIATION GASOLINES. Tenamene 2 is a mobile tan-to-red liquid comprising N,N'-di-sec-butyl p-phenylenediamine. For motor fuels generally, 2.6 to 26 lbs. per 1000 bbls. are used. Tenamene 2 has been thoroughly tested in aviation gasolines and approved for military purposes. It is highly resistant to extraction by water and caustic solutions. In hot, humid climates Tenamene 2 greatly retards deterioration of aviation gasoline that results in lead deposits. The maximum concentration allowable in aviation gasolines (8.4 lbs. per 1000 bbls.) should be added.

FOR COPPER CONTAMINATION. Tenamene 60, third member of the Tenamenes, is a mobile, red liquid composed of 80% disalicylal propylene di-imine in toluene. Traces of copper are often found in gasoline—from treating processes or from copper equipment employed during production, storage or use. Tenamene 60 overcomes the catalytic effect of copper on the oxidation stability of gasoline.

TESTS PROVE TENAMENE EFFECTIVE. Various tests with all types of gasoline proved the effectiveness of the Tenamenes. Uninhibited gasoline deteriorated rapidly in storage, forming considerable gum. Tenamene stabilized gasoline formed little gum in prolonged storage. Tennessee Eastman will be glad to make these analyses on any refiner's gasoline.

HOW TO USE TENAMENE. In general, unrefined cracked gasoline should be treated with Tenamene promptly after condensation. Refined gasoline should be treated as it is pumped to storage. If delay is necessary, add small amounts initially, the balance later. Tenamenes can be added in concentration, but are better added as dilute stock solutions since small quantities are generally involved. Common procedures are the proportioning pump, eductor or gas-pressure method. Tenamene 1 and 2 should be protected from air to prevent discoloration. Tenamene 60, however, does not need inert atmosphere for application.

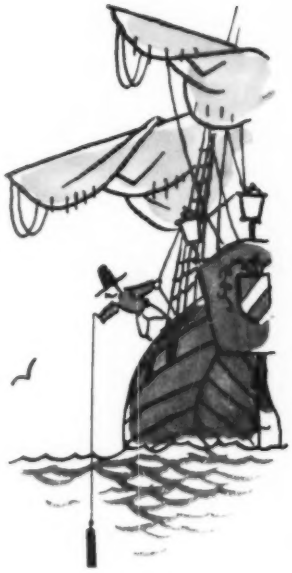
WHERE CAN YOU GET TENAMENE? Eastman can give top service on your requirements of these excellent additives. Stocks of Tenamene are carried at five convenient locations. A glance at the map below shows delivery schedules. Write to one of our sales representatives* or to Kingsport, Tennessee for prices, specifications, and other information.



Tenamene EASTMAN GASOLINE ADDITIVES

TENNESSEE EASTMAN COMPANY, *Division of Eastman Kodak Company, Kingsport, Tennessee*

***SALES REPRESENTATIVES:** New York—10 E. 40 St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; Houston—412 Main St. **WEST COAST:** Wilson Meyer Co., San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.



THE FIRST AND
THE LAST WORD
IN LOGGING!

WHY OPERATORS
PREFER
SCHLUMBERGER!

see

NATIONAL BANK OF TULSA

NBT

For your

OIL FINANCING

Long experience in dealing with the financial problems of the oil man has given NBT's oil loan officers a realistic understanding and an intelligent approach to oil development and financing. Our adequate resources, facilities and services assure you fair consideration and prompt action. Come in now for a confidential discussion with one of our friendly officers.

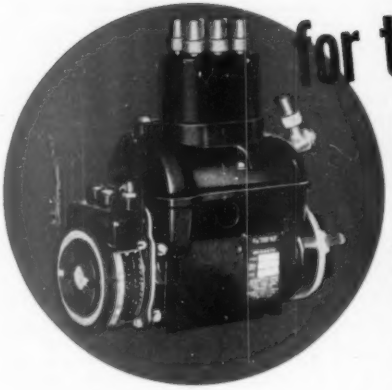
The Oil Bank of America

NATIONAL BANK OF TULSA

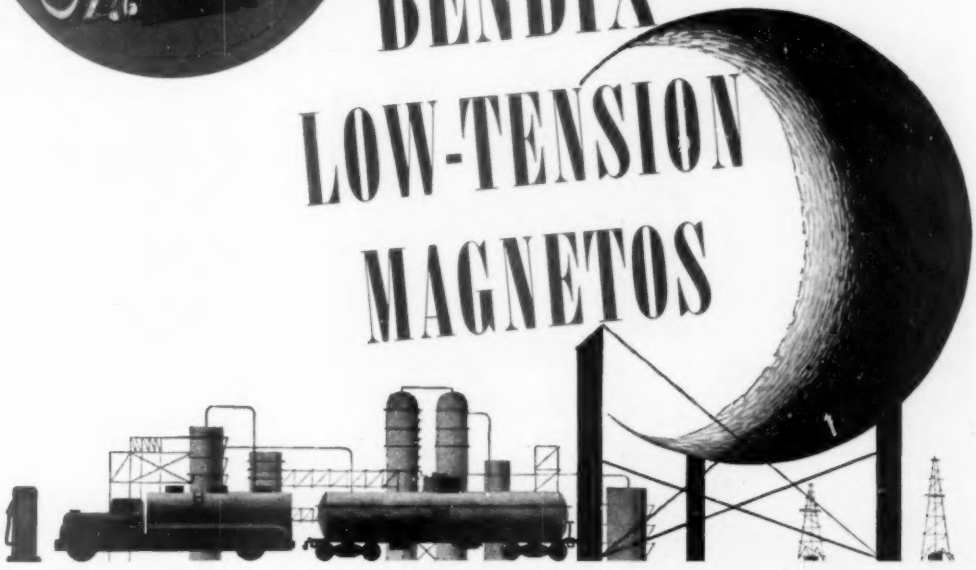
OFFERING COMPLETE BANKING AND TRUST SERVICES

Member Federal Deposit Insurance Corporation

Designed for the Petroleum Industry—



BENDIX LOW-TENSION MAGNETOS



It's the magneto designed to eliminate fire hazard, foremost problem of the petroleum industry. The special ventilating arrangement of the Bendix Low-Tension Magneto permits air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

In addition to this important safety feature, Bendix Low-Tension Magnetos actually reduce engine maintenance and operating costs. For example, spark plug erosion is reduced to a minimum. The distribution of low-tension voltage to the high-tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with the conventional distributor. Variable or fixed sparks can be obtained by internal adjustment.

For safety and low operating costs it will pay you to specify Bendix Low-Tension for all your magneto requirements. Complete data available on request.

- **Low Plug Erosion Rate**
- **Breaker Type Distributor**
- **Ventilation without Fire Hazard**
- **Radio Shielding Available**
- **Variable or Fixed Ignition**

Bendix

SCINTILLA MAGNETO DIVISION OF
SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

FACTORY BRANCH OFFICES:
117 E. Providencia Avenue, Burbank, California • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan
Brouwer Building, 176 W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market Street, San Francisco 4, California

TAPECOAT*

. . . Your first line of defense against Corrosion on Pipe, Pipe Joints, Couplings and Tanks

TAPECOAT requires no foreign adhesive to bond it to surfaces as the coal tar serves as both bond and protection.

*Reg. U. S. Pat. Off.

Underground or above ground, TAPECOAT withstands severe corrosive attack. Over the past 11 years, this original coal tar protection in handy tape form has proved its dependability in guarding against moisture, acids, alkalis, chemical fumes and other severe conditions. As your first line of defense, TAPECOAT assures greater protection, reduces maintenance and cuts pipe replacement cost.

TAPECOAT is quick and easy to apply with the use of a torch to bleed the coating and insure a perfect bond. It is sized to the job in widths of 2", 3", 4", 6", 18" and 24". Wrapping is done spirally with widths up to 6", and "cigarette-wrapped" in the larger sizes.

Write for full details and prices.

The TAPECOAT Company

Originators of Coal Tar Tape Protection

1539 LYONS STREET, EVANSTON, ILLINOIS

They Say—

How Not to Find Oil

"We owe nearly every field in the country to competitive exploration, to somebody's drilling where others wouldn't.

"A monopoly, whether public or private, has but one set of judgments. What that set of judgments decides not to drill isn't drilled. A monopoly is unlikely to find the Cuyama Valleys and Signal Hills and Scurry Counties.

"A government has the further handicap not shared by private monopolies: the odds are too long for a government official to take. In the United States, where nearly ten thousand geologists and geophysicists aid in the search, only one wildcat out of nine seeking a new field gets oil or gas; the other eight are dry holes. What government official would dare risk his official neck on one chance in nine? How long would he keep his official head if the first six or seven or eight wells were dry? A monopoly is the poorest known instrument for finding oil, and of all monopolies a government monopoly is the poorest.

"If I were to paint a sign for the people of a country with oil possibilities, this is what I would paint: If you want to keep your oil in the ground, let your government hunt for it."

Max W. Ball, consultant, addressing the Commonwealth Club of California, San Francisco.

Enough May Be Too Much

"I know this for a certainty—that when we have had *enough* government in business for *enough* time, we shall have lost our free enterprise system of government—the thing that has really made us great. It has happened in Great Britain and every other place where government control by socialists or others has taken over business, and we shall be no exception to the rule.

"Today scarcely a move can be made with respect to production, wages, prices, or sales without official approval from someone in Washington, as you well know, and when the Government controls these features of a business it controls not only the capacity of the industry to produce, to improve its position and to make profits, but its very life as well.

"This has been going on for a long time. Life seems to have been one succession of war, preparations for war, and other emergencies requiring extraordinary government

controls for a period of over twenty years. And the end is not in sight.

"One could accept the proposition that all of these controls are necessary or advisable as a part of our program of mobilizing for national defense with some degree of tranquility if one could be sure that the boys in control were ready and determined to relinquish the controls at the earliest possible moment.

"And out of these issues arises an ironic anomaly. If the Russian communists can persuade us by cold-war tactics to maintain our present system of government controls indefinitely, then they will have won a tremendous victory. They will have saddled upon us a system of collectivism—an ideology akin to their own—without firing a shot, and that I call a master strategem.

"In speaking about government and government controls, the ancient Greek philosopher spoke with great wisdom when he said, 'Government is like fire—a dangerous servant and a fearful master. Don't throw yourself in its arms. It may consume you.'"

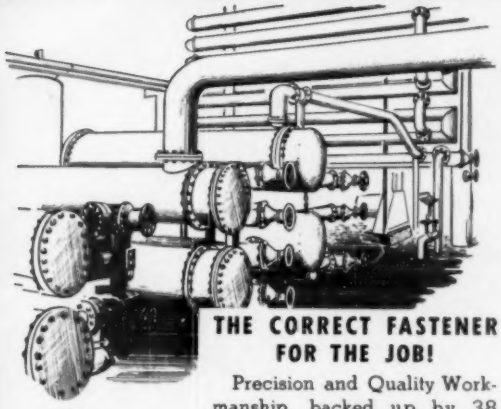
P. C. Spencer, president of Sinclair Oil Corp., speaking in Chicago.

CALENDAR OF EVENTS

MAY

13-15	Pennsylvania Gas Association, Wernesville, Pa.
15-16	American Petroleum Institute, Division of Production, Pacific Coast district, Biltmore Hotel, Los Angeles.
16	University of Kansas City, symposium on oil and gas, Kansas City.
16-18	Appalachian Geological Society and the Oil and Gas Section of the Engineers' Society of Western Pennsylvania, joint meeting, Morgantown, W. Va.
17	Permian Basin Geophysical Society, first annual meeting, Scarborough Hotel, Midland, Tex.
19-20	American Petroleum Institute, Division of Marketing, midyear meeting, Sheraton-Plaza Hotel, Boston.
19-20	American Association of Oilwell Drilling Contractors, seventh annual safety clinic, Adolphus Hotel, Dallas.
21-23	Gas Appliance Manufacturers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo.
26-28	American Gas Association, production and chemical conference, Hotel New Yorker, New York.
27-28	American Petroleum Institute lubrication committee, Mayo Hotel, Tulsa.
27-29	Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.
28-30	Seventh annual short course in gas technology, sponsored by the Southern Gas Association, Texas College of Arts and Industries, Kingsville, Tex.
29-30	Society of Exploration Geophysicists, Gulf Coast regional meeting, Rice Hotel, Houston

For DEPENDABILITY in REFINERY EQUIPMENT



THE CORRECT FASTENER FOR THE JOB!

Precision and Quality Workmanship, backed up by 38 years of Erie experience, are yours for thoughtful buying. Whether you require a fastener made from carbon, alloy or stainless steels, to special design, to exacting specifications, Erie fasteners will save you time and expense . . . from your planning, to procurement, to fabrication. Submit your fastener requirements to us, Erie Service will meet the challenge.

A SUBSIDIARY OF Barium STEEL CORPORATION Steelwright to the Nation

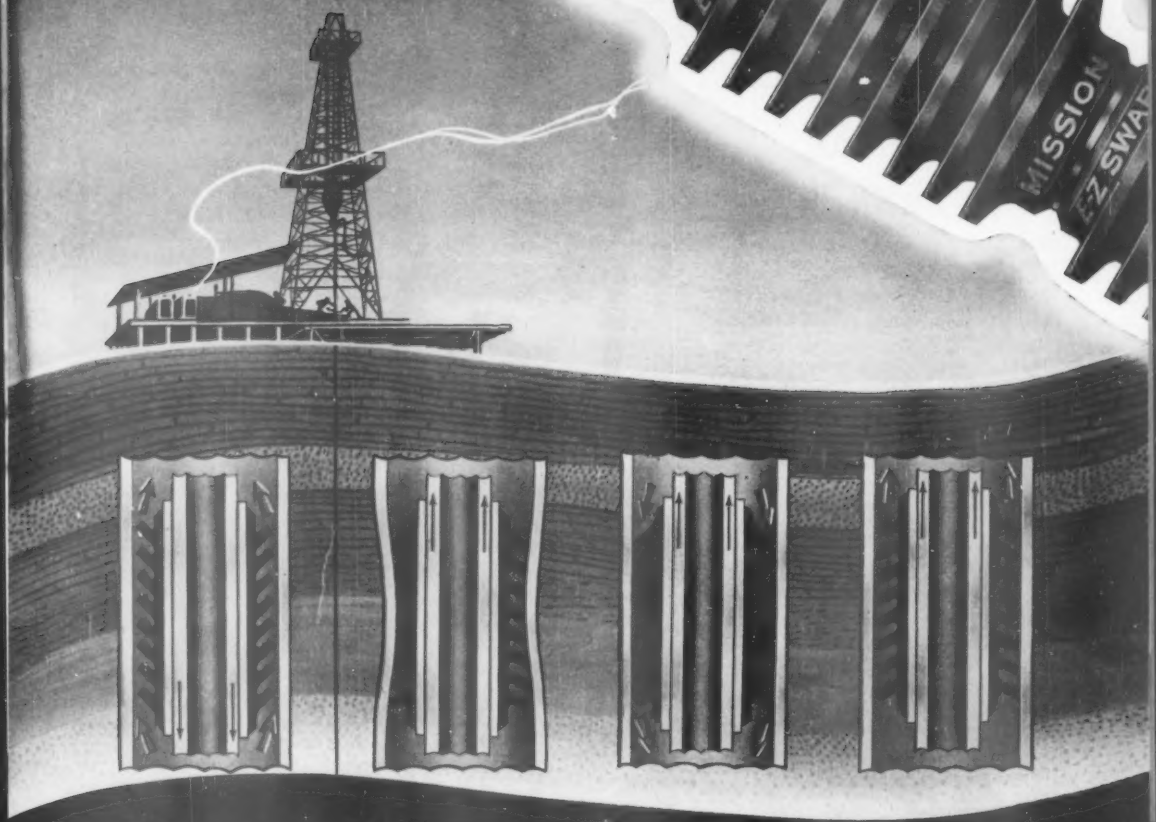
ERIE BOLT and NUT CO.
ERIE • PENNSYLVANIA

STUDS • BOLTS • NUTS
ALLOYS • STAINLESS
CARBON • BRONZE

Representatives in Principal Cities.

Presenting!

AN OUTSTANDING ADVANCEMENT IN SWABBING



On the down stroke fins are in normal upturned position, allowing E-Z Swab to fall free.

Flexibility of fins allows E-Z Swab to pass smoothly through tight spots on up or down stroke.

E-Z Swabs automatically by-pass fluid overload. Each rubber will lift approximately 400 feet of fluid. Rubber fins bend down and unload excess fluid.

After overload fluid is passed, fins spring up and seal against tubing.

NEW

MISSION E-Z SWAB

makes your swabbing easier, safer, better at far lower costs

Mission engineers set out years ago to perfect a tool that would make any swabbing job safer and easier. Here's the result . . . the new Mission E-Z Swab which brings advantages and economy to the field that never have been incorporated in any other swab. Under the most adverse and varied conditions we could find, Mission E-Z Swabs have proved superior in run after run. If Mission E-Z Swabs do not prove more satisfactory in comparative tests than the make you are now using, the entire purchase price will be promptly refunded. Ask your Mission Representative for complete details or write for Bulletin No. E-Z 751. Specify Mission E-Z Swabs at your supply store.

MISSION MANUFACTURING CO.

HOUSTON, TEXAS

Export office: 30 Rockefeller Plaza, New York

Why does CAMERON lead the field, year after year, in

Xmas tree sales ?

Superior Equipment

Undivided Responsibility

Reliable Field Service

JUNE

1- 6 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton hotels, Atlantic City, N. J.

2- 4 Seventh annual short course on process instrumentation, A. & M. College of Texas, College Station

5- 6 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

5- 7 National Oil Scouts and Landmen's Association, annual convention, Hilton Hotel, Albuquerque, N. M.

7 California Natural Gasoline Association, annual June Frolic, Rio Hondo Country Club, Downey, Calif.

8-12 Canadian Gas Association, Chateau Frontenac, Quebec.

9-14 American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver.

12-13 Western Petroleum Refiners Association, regional technical and industrial-relations meeting, Broadview Hotel, Wichita.

13-14 Rocky Mountain Oil and Gas Association, midyear meeting, Rainbow Hotel, Great Falls, Mont.

16-22 International Gas Conference, Brussels, Belgium.

19-20 Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky.

22-25 Petroleum Equipment Suppliers Association, Mark Hopkins Hotel, San Francisco.

23-24 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

23-27 American Society for Testing Materials, annual meeting, Hotel Statler, New York.

23-27 American Institute of Electrical Engineers, summer general meeting, Nicollet Hotel, Minneapolis.

AUG.

1- 3 Wyoming Geological Association, field trip, Big Horn basin.

11-13 Society of Automotive Engineers, national West Coast meeting, Fairmont Hotel, San Francisco.

19-22 American Institute of Electrical Engineers, Pacific general meeting Westward Ho Hotel, Phoenix, Ariz.

25-27 Twelfth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPT.

3- 5 Pacific Coast Gas Association, Ambassador Hotel, Los Angeles.

8-12 Instrument Society of America, seventh national instrument conference and exhibit, Cleveland.

10-12 National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J.

11-13 American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago.

25-26 Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.

28-30 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

OCT.

1-3 National Association of Corrosion Engineers, South Central section, technical program and committee meetings, Jung Hotel, New Orleans.

1- 3 American Institute of Mining and Metallurgical Engineers, Mid-Continent fall meeting, petroleum branch, Rich Hotel, Houston.

4- 3	Petroleum Electric Power Association, twenty-third annual meeting, Mayo Hotel, Tulsa.
6	Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.
9-10	California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.
13-15	Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.
13-17	American Institute of Electrical Engineers, fall meeting, New Orleans.
16-19	Permian Basin Oil Show, Odessa, Tex.
19	Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
20-21	Independent Petroleum Association of America, annual meeting, Mayo Hotel, Tulsa.
22-24	Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
23-24	American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, petroleum branch, Statler Hotel, Los Angeles.
27-31	American Gas Association, annual convention Atlantic City, N. J.
30-Nov. 1	Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4	Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.
6- 7	Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
6- 8	Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Texas.
8-13	Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.
10-13	American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
13-14	Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.
20-22	Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.
30-Dec. 5	American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

7	Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
7-10	American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

the oilfield valve that's years ahead, the

CAMERON NON-LUBRICATED LIFT-PLUG VALVE

Engineered and produced by oil-country people who understand the severe service conditions that are peculiar to oilfield operations, this valve provides a tight shut-off and easy operation without any of the headaches that go with lubricated plug valves.

Cameron

IRON WORKS, Inc.

P. O. BOX 1212 • HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. Represented in sterling area by: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London S.W.1, England

SPECIFY
NORRIS QUALITY
4 B-V-THD STD. SEAMLESS
W. C. NORRIS' M
70 YEARS
NORRIS QUALITY
4 B-V x 2 STD. SEAMLESS
NORRIS QUALITY
6" x 4" STD
W. C. NORRIS, MANUFACTURER, INC.
TULSA, OKLAHOMA
WEST COAST DISTRIBUTORS:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA
Los Angeles
BRANCHES:
EXPORT
REGISTER and VOTE — It's YOUR duty!

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

●

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

EDITORIAL STAFF

C. O. Willson, **Editor;** Kenneth B. Barnes, **Managing Editor;** Henry D. Ralph, **News Editor;** George H. Weber, **Refining Editor,** 500 Fifth Avenue, New York; Dahl M. Duff, **International Editor,** 500 Fifth Avenue, New York; Gerald L. Farrar, **Engineering Editor;** Paul Reed, **Pipe-Line Editor;** W. L. Nelson, **Technical Editor.**

Associate Editors: Lynn M. Nichols, Neil Williams, R. B. Tuttle, Philip C. Ingalls, and John C. Casper.

District Editors: TULSA: Ted A. Armstrong, Joseph A. Kornfeld, John C. Reidel, William P. Sterne, Robert J. Enright, and John C. McCaslin. HOUSTON, Sterling Building: Walter Rose, and F. Lawrence Resen. LOS ANGELES, 650 South Grand Avenue: D. H. Stormont. DALLAS, Mercantile Bank Building: Carl F. Hoot. WASHINGTON, D. C., 621 Albee Building: Bertram F. Linz. MIDLAND, TEX., McClintic Building: Roy F. Carlson. CHATHAM, ONT., 35 Stanley: Victor Lauriston.

Editorial Assistants: Connie Farrar, Tulsa; Martha Allbright, Tulsa, and Lucy Dee Owen, Houston.

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

Advertising Offices: TULSA: John D. Reilly, Mid-Continent Manager, 211 South Cheyenne; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre 4-1750; CHICAGO: C. R. Farmer, Manager, and E. S. Klappenbach, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic 1-4835; HOUSTON: John M. Spears, Gulf Coast Manager, Sterling Building, Phone Charter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone Vandike 0732; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702.

●

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1952 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

New Face

DOES your Journal look different this week? It is different. We have a new face—literally. A new type face. This page is printed in it, and so is the news section this week. The rest of the Big Yellow Book will use it just as soon as possible. (We couldn't change everything all at once because our weekly deadlines come so close together they overlap.)

The new type is bigger than we used to use—easier on bifocal eyes. It's known as 9-point type on a 10-point slug. A "point" is a printer's measure for an itzy bitzy space—one-tenth the distance between the centers of two of these lines. Our old type was "8 on 9." So you can see how much difference a point makes.

"Oh fine," you probably are saying, "but with bigger type you can't get so many words on a page, so I'm getting gypped in the quantity of reading matter."

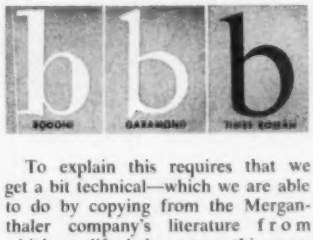
That's where you're fooled. There are just as many words per page as with the old type. We didn't believe it either at first, and we made the type salesman prove it to us upside down and backwards. But we can get an average of about 1,200 words on a solid page with this type just as we did with the old.

How come this miracle? It's quite a yarn. Read on.

Just the Type

EVERY type design, or face, has a name, and the name of what you are reading now is Times Roman. It was originally designed for The Times of London, a conservative newspaper if there ever was one. It proved to be so readable that American publishers became interested. So Merganthaler Linotype Co., which makes lots of types and typesetting machines, imported it.

Times Roman has the great advantage of being condensed without looking condensed. It's not extremely condensed, like some newspaper headline type where the letters look flattened. In this type each individual letter looks its proper shape and yet it is so skillfully designed that it doesn't take a bit more space than absolutely necessary. In fact, a complete alphabet in Times Roman 9-point takes about 10 per cent less space than in our old 8-point type, and this 10 per cent saving neatly offsets our use of a 10-point slug instead of the old 9-point slug.



To explain this requires that we get a bit technical—which we are able to do by copying from the Merganthaler company's literature from which we lifted the cut on this page.

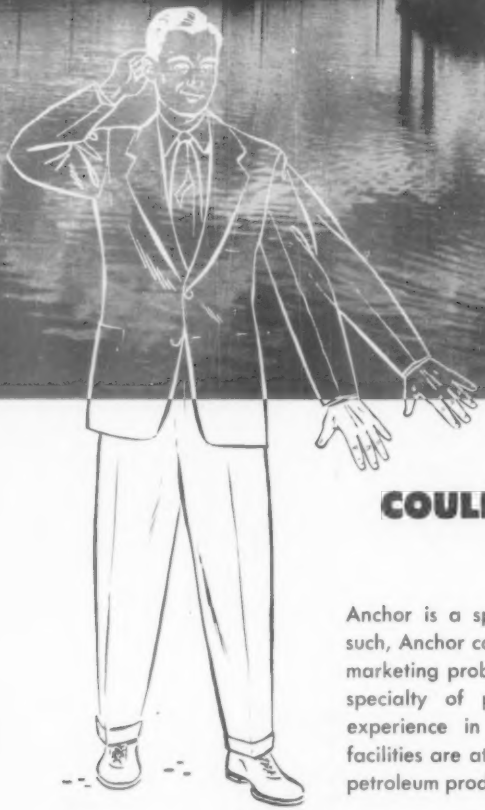
By comparing the blown-up "b" of Times Roman with a couple of other type faces, you can see some of the things that make the difference. A change has been made in the serifs. A serif is a little extra dohickey that sticks out a bit, like the points hanging down from the arm of a capital "T." The headline type on this page doesn't have any—it's sanserif.

In Times Roman, the usual foot serif is eliminated and the top serif has been streamlined. The thin lines (hairlines) of the letters are heavier. And the weight of the curves is concentrated at the top right and bottom left of the letter. With other type faces it is in these hairlines and curves that the eye action usually slows down. This isn't the case with Times Roman; the letters are easier to recognize, and the eye moves along with less effort. (We're lifting all this from Merganthaler.)

There's a lot more stuff, too, about such things as the relative heights of capitals and small letters, and the sizes of the "ascenders and descenders"—those tails that stick up or down from the main part of the letter. It all gets very technical.

Bet you didn't know there was so much to designing type. Neither did we. But we like this new type, and we hope you do, too.

Henry D. Ralph



COULD YOU USE AN EXTRA HAND?

Anchor is a specialist at marketing petroleum products. As such, Anchor can serve you as an extra "hand," lifting all your marketing problems from your shoulders, freeing you for your specialty of producing, refining, etc. Anchor's years of experience in buying and selling and Anchor's extensive facilities are at your service whether you wish to buy, or have petroleum products to sell. Call Anchor for this helping "hand."

ANCHOR PETROLEUM COMPANY TULSA

SALES OFFICES: DES MOINES • OMAHA • TOLEDO • HOUSTON • LOS ANGELES

THE OIL AND GAS
JOURNAL
Vol. 51, No. 1

CONTENTS FOR MAY 12, 1952

NEXT WEEK

- Geology of the Paradox Basin
- Sand-Filled Perforations and Their Effect on Well Performance
- Plastic Coatings Aid Refiners in Fight Against Corrosion
- Fluid Hydroforming — Results from Pilot Plant and Full-Scale Unit
- The Arosorb Process — a New Refining Tool
- New Drilling Record Set for Deep Oklahoma Well
- Other articles and regular features.

REGULAR DEPARTMENTS

They Say 72
Calendar of Events 73
Journally Speaking 79
Editorial 83
This Week 84
International News 103
Personals 108
Deaths in the Industry 110
Books 174
On the Job 175
Engineering Reference 181
Progress in Metals 183
Refiner's Notebook 185
Modern Drilling 187
Engineering Fundamentals 189
Corrosion Control 191
Equipment Digest 193
Pipe-Line News 199
Drilling Contractors 203
Active Rotary Rigs 203
Refining News 205
Natural-Gas News 210
Natural-Gasoline News 210
Exploration Statistics 236
Production Statistics 237
Refining Statistics 238
Market Statistics 239
Equipment Men in News 240
Classified Advertising 243
Advertisers' Index 247

EXPLORATION— DEVELOPMENT

Stimulants for Delaware Basin 213
Highlights of Week 213
Reports by Areas 215

NEWS FEATURES

Strike Closes More Plants, Interrupts Transport and Production 85
Government Apparently Not Planning Any Drastic Strike Action 86
More Carbon Black From Oil Results in Less From Natural Gas 87
Bright Future Seen for Natural Gasoline Plants in Petrochemicals 88
Salt Lake Refiners Look to Uinta Basin for Future Crude Supply 90
Shell's Cedar Creek Well May Be Biggest in Williston Basin 91
Progress Pacific to Go Ahead With West Coast Line Regardless 92
Bureau of Mines Says Secondary Recovery in California Is a Must 92
Minckler Predicts Oil Shortage in California by 1955 93
Union Rates Its New Sespe Discovery as Being of Major Importance 93
Third-Quarter Tubular Goods Allocations Revealed by PAD 98
Accelerated Amortization Granted by DPA for 39 Industry Projects 98
Tidelands Bill to Head for Expected Presidential Veto This Week 100
First Shipment of Sumatra Crude Oil Leaving Far East This Week 103
Saudi Arabia Making Strong New Demands for Participation 104
Negotiations Over Right-of-Way Agreements Opened in Damascus 105
Products Line to Supply Bogota to Begin Operation During May 105
Commercial Producer Indicated in Dutch Test in South Holland 106

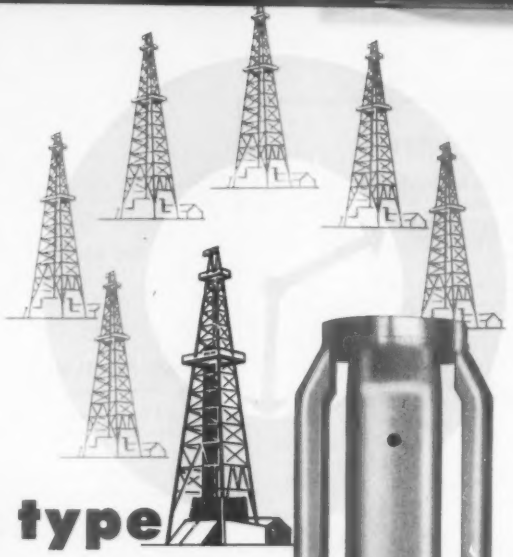
NATURAL-GAS SECTION

Story of United Gas Pipe Line's Expansion 111
Details of $181,000,000 program. By N. C. McGowen, president, United Gas Co.
United Building Nine New Compressor Stations 114
United's Overland Pipe-Line System 116
United's Offshore Pipe-Line System 122
Texas Eastern's Expansion Nears Completion 126
791 miles of 30-in. line plus facilities added. By R. H. Hargrove, president, Texas Eastern Transmission Corp.
How T.E.T.'s New Carrier Was Constructed 132
Nine New Compressor Stations in T.E.T. Expansion 139
United and T.E.T. Jobs to Be Finished on Time 146
By L. C. Bolin, vice president, Brown & Root, Inc.
New Record for Gas Sales in 1951 154
Control of an Industrial Process Gas Load 156

ENGINEERING - OPERATING FEATURES

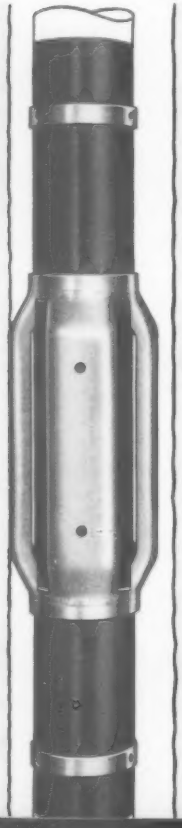
New Petrochemicals Plant at Edmonton 159
Water Floods That Failed 162
New Oil-Base Emulsion Mud 166
Packaged Treater for Sour Field Gas 167
Peppers Adds Cycloversion and Cat Poly Units 170
Right Torque for Sucker-Rod-Joint Makeup 172
On the Job . . . In the Plants 175-176
Cities Service improves dye mixing at Lake Charles.
On the Job . . . In the Fields 178-179
New Phillips safety belt.
Engineering Reference Section 181
Progress in Metals 183
Refiner's Notebook 185
Modern Drilling 187
Engineering Fundamentals 189
Corrosion Control 191
Equipment Digest 193-196

sooner or later you will want



BAKER rigid type CASING CENTRALIZERS

In line with the long established "Baker Policy" of furnishing the most efficient means of centering your casing, the new Baker RIGID TYPE Casing Centralizer is offered to supplement the outstanding Baker SPRING TYPE Centralizers.



Baker RIGID TYPE Casing Centralizer, Product 9131

CHOOSE THE "TYPE" YOU NEED

If your formations have a tendency to slough off, form cavities, or to wash out, you should continue to use Baker SPRING TYPE Casing Centralizers. The flexibility of the springs permits them to expand and compensate for these variations in hole size and still provide *maximum* centering force.

However, in harder formations, the Baker RIGID TYPE Casing Centralizer (Product No. 9131) is the one to use.

EASY TO INSTALL—POSITIVE CENTERING

The Baker RIGID TYPE Casing Centralizer normally is merely slipped over the casing and allowed to travel freely between collars. If exact spacing is desired, the Stop Collars are spot welded to the casing to prevent *vertical* movement of the centralizer, but to permit *free rotation* of casing while the *centralizer remains stationary*.

Baker RIGID TYPE Casing Centralizers are available to run on casing from 5½" to 9⅝" O.D., to center casing in well bores with minimum gauge from 7⅜" to 12¼". The inflexible "pads" ensure *positive clearance* between the casing and the wall of the open hole when casing is being cemented in harder formations.

FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

Is this strike for beefsteak or for a different stake?

"THIS strike is taking place because the men who run the corporations figure that no man in khaki clothes should know the taste of beefsteak."

So says the official publication of the Oil Workers International Union (C.I.O.) in an editorial declaring that the oil strikers only want to maintain their standard of living and are fighting a "handful of powerful men hell-bent to freeze wages at a subsistence level."

Is this true? Not according to the U. S. Bureau of Labor Statistics. Its unchallenged statistics show that:

... The average refinery wage rate last year was 30 per cent higher than in all manufacturing industries in the United States.

... Since 1945 refinery wage rates have increased more rapidly than those in all manufacturing industries.

... Refinery wage rates have increased 63 per cent since 1945, while the cost of living went up 44 per cent.

... The average refinery worker's ability to purchase goods in 1951 was 13 per cent higher than in 1945, measured in prewar dollars.

DO such figures show that oil companies are hell-bent to freeze wages at a subsistence level? In the present controversy most companies were ready to grant further wage increases to the limit of the Government's stabilization rules, so it must be concluded that the big stake in this strike is not so much beefsteak as something else.

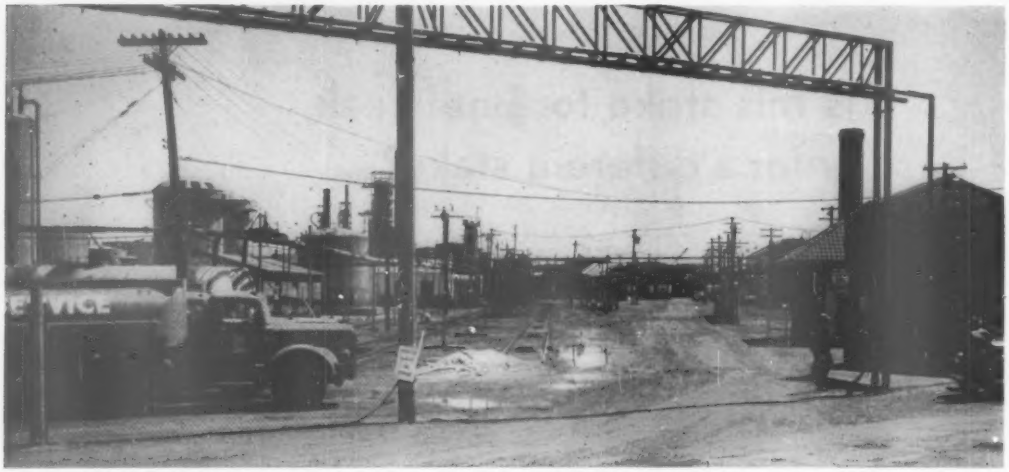
One obvious and admitted objective is to break the stabilization formula, and this makes it a strike against the Government in which the companies are unwilling and helpless pawns.

BUT an even greater stake appears to be dominance by the O.W.I.U. This union has never been successful in its attempts to organize many large refineries, nor to bring about company-wide and industry-wide bargaining, which is a keynote of C.I.O. policy. So in previous strike threats O.W.I.U. has had to submit to the traditional pattern of local plant-by-plant collective bargaining, and this has kept it from dominating the nation's oil workers.

In the current campaign O.W.I.U. got a large group of A. F. of L. and independent unions to join it in a "united front" in presenting wage demands. Now it is insisting that no local union can settle with local management without the approval of the central committee. If this scheme succeeds, the O.W.I.U. will in effect have the industry-wide bargaining it seeks and henceforth all independent unions will dance to the C.I.O. tune.

We wonder how many oil workers really believe that the management is hell-bent to keep them from knowing the taste of beefsteak.

THIS WEEK



IDLE REFINERIES cut output of petroleum products by more than one-third last week as some 100,000 workers were on strike. Shutdowns were orderly and picketing peaceful, as at this gate of the Cities Service refinery at Linden, N. J.

STRIKE.—Washington hints at firm action to prevent gasoline shortage resulting from prolonged strike. . . . ¶No pattern for voluntary settlement of wage disputes apparent as strike entered second week. . . . Spreading shutdowns threatened imminent closing of about half nation's refining capacity. . . . ¶Because of picketing and indirect effects, many pipe lines, natural-gasoline plants, terminals were closed or curtailed operations. . . . Crude production was rapidly being cut back in many areas, some places drastically. . . .

INTERNATIONAL.—First tanker loaded with Sumatra oil scheduled to leave Far East this week. . . . Crude comes from Minas field, drilled in during war by Japs and developed by Caltex. . . . Field now has 33 wells, reserves estimated at half-billion barrels. . . . ¶Saudi Arabia, already holding 50-50 agreement with Arabian American, now wanting more. . . . Reports are government wants nationals to fill half of directors' posts, cut in concession size, guarantees against losses due to war. . . . ¶Iran makes first sale of oil—300 bbl. of bunker fuel to an Italian merchant ship. . . . ¶Colombia's new 87-mile products line from Porto Salgar to Bogota to begin operating this month.

DRILLING.—Biggest well in Williston basin is Shell discovery near Glendive, Mont. . . . Well is northwest extension to Cedar Creek discovery, flowed at rate of 3,500 bbl. daily after acidizing. . . . ¶Three more completions reported in Tioga and Beaver Lodge areas of North Dakota. . . . ¶Two extensions in Utah's Duchesne and Roosevelt areas flow oil on tests. . . . ¶Sunray chalks up significant gas and distillate discovery in northwestern Oklahoma. . . .

WEST COAST OUTLOOK.—General Petroleum president says California will have a crude shortage within a few years. . . . Reasons given by Minckler: not enough important discoveries, sharp upward trend in demand. . . . ¶Progress Pacific planning to build crude line from West Texas to California regardless of plans for similar line of West Coast Pipe Line Co. . . . Line, company says, will be started as soon as controls on pipe are lifted. . . . ¶Bureau of Mines report recommends increased attention be given secondary recovery in California. . . . Increased operations necessary, report says, if the state is to remain an important producing area. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,324,925 bbl. daily for week ended May 3, down 49,350 bbl. daily. . . . ¶Total well completions for the week increased 62 wells to 906. . . . Wildcat completions totaled 208 compared with 199 for previous week and 200 for same week last year. . . .

TRENDS.—Rotary rigs operating in United States on May 5 jumped to 2,815, a new record for this year. . . . Current operations represent an increase of 413 rigs over corresponding date last year. . . . The average number of rigs operating in the 18 weeks of this year has been 2,741 compared with 2,193 for same period last year. . . .

GOVERNMENT.—House and Senate settle differences over tidelands bill by accepting Senate version. . . . Bill expected to head this week toward President. . . . With veto almost a certainty, question now is whether Senate can muster enough strength to override. . . . ¶FCC approves plan to establish hurricane-warning service along Gulf Coast. . . . Six-station setup would give refineries and other plants more advance warning. . . . ¶Chapman to tell Florida group Interior Department will not relinquish mineral rights in Everglades National Park. . . .

STEEL.—Bruce Brown spikes reports the nation has steel in abundance. . . . In making third-quarter allotments, Brown says steel strike costs oil industry 5,000 tons of tubular goods per day. . . . Currently threatened strike, he says, might cut into oil's steel supplies even more drastically. . . . PAD head says fourth-quarter picture is gloomier than third quarter. . . .

Strike Cuts Supplies

Truman trying to avoid Taft-Hartley Act use, but first steps are taken; union refuses plea to return to work

CREEPING paralysis spread through the petroleum industry last week as strikes closed more refineries and interrupted production of crude oil and transportation of products.

As more and more activities closed down and consumers in many areas faced an imminent shortage of gasoline, government agencies in Washington at the week's end prepared to take sudden action if necessary.

Late Thursday the Wage Stabilization Board held a special meeting to prepare a report for the White House covering the oil situation. Such a report was a necessary first step toward invoking the Taft-Hartley law under which the Government could obtain an injunction requiring the strikers to return to work for 80 days.

Earlier in the day, however, President Truman stated that he was not planning to use the Taft-Hartley procedure at this stage.

Return to work refused . . . The WSB previously had confined its activities to efforts to promote settlement by voluntary agreements. It asked companies and unions to resume negotiations and suggested that the strikers return to work pending final settlement. Wednesday night, however, O. A. Knight, president of the Oil Workers International Union, refused to call off the strike during negotiations for new contracts.

Strikes which were called April 30 in refineries representing about one-third of the nation's capacity were spreading to other plants so that about half of total refining capacity was threatened by the shutdown.

With no signs of immediate settlement apparent, tempers were growing short and drastic action was talked. Strikers threatened to picket unstruck plants and terminals in order to prevent gasoline and other products from moving to filling stations of companies involved in the dispute.

Some pipe lines and natural-gasoline plants were struck. Others severely curtailed their operations because of the shutdown of refineries or pipe lines with which they are connected.

As refinery and pipe-line storage filled up, purchasers had to stop taking crude oil. As a result, production fell off rapidly. Some fields were closed entirely. In others, output was down by amounts varying from 10 to 90 per cent. Every effort was being made to prevent closing down water-flood operations.

Filling stations in scattered areas throughout many parts of the country were running short of supplies. Many others were imperilled by the threat to picket bulk terminals, since nonstriking tank-truck drivers probably would not cross such picket lines.

Demands lowered . . . The Oil Workers International Union and 21 A. F. of L. and independent unions cooperating with it in a united front appeared to be ready to recede from their original demands for an increase of 25 cents an hour in basic wages.

There were scattered reports at the week's end that some refineries were settling for increases of 18 or 18½ cents an hour. However, it was not always clear whether these figures represented a flat increase in the hourly rate or also included so-called fringe benefits.

Union officials were quoted as saying that any company offering 18½ cents "cash" would find the workers ready to negotiate. At the same time they denied that settlements were being accepted at a number of plants where the figure of 18 or 18½ cents was being discussed. Some of these were described as "package deals" where the actual rate increase was about 15 cents an hour but retroactive payments, night-shift differentials, and other fringe benefits were estimated to have an average value of 3 cents per man-hour.

Earlier top union officials repudiated a settlement agreed to by workers at the Sugar Creek, Mo., refinery of Standard Oil Co. (Ind.), even though the Federal Mediation and Conciliation Service in Washington had announced approval of the agreement. This was for an hourly increase of 15 cents, plus fringe benefits.

Difference—3 cents . . . Both companies and unions generally declined to reveal the basis of negotiations at most struck plants, but it was understood that most companies were offering 15 cents while the unions generally were refusing to consider anything less than 18 cents.

Thus it appeared that only 3 cents an hour in basic wages stood in the way of a settlement. The requested increases in night-shift differentials did not appear to be much of a stumbling block. Various arrangements for retroactive payments were being discussed, since the locals in many plants have been working under expired contracts for varying lengths of time.

This 3-cent difference, however, looked big to many refinery operators. Refinery wages have increased greatly since the war while prices for refined products have remained relatively static. In some parts of the country, particularly the Mid-Continent, the recent market for some refined products has been so weak that many refineries have been operating on a very small margin.

Some observers felt that even an increase of 15 cents an hour in wage rates might make it unprofitable to continue the operation of smaller refineries.

West Coast uneasy . . . On the West Coast no refineries were struck but the situation was precarious, as most of the plants were on 24-hour strike notice. Negotiations with several major companies were alternately in progress and disrupted. Reports that a basis of settlement had been reached at some of the refineries were not confirmed by top union officials.

At the outset of the strike the unions announced that the West Coast would not be struck because of the military situation. As the strike spread in other parts of the country, however, union officials said they would not allow a strike of long duration across the country if a strike in California would settle it.

Northeast quiet . . . The Northeast was relatively unaffected by the strike, although there were reports that some filling stations in New England were running short of supplies. But there was increasing concern over the serious result of the lost production on next winter's supply of heating oil.

Marketing officials in New York said a prolonged shutdown on the Gulf Coast would make the outlook for next winter's heating-oil supply in the Northeast extremely serious. Even before the strike began, the industry had been anticipating a narrow margin of supply for the coming heating season.

A more immediate threat to supply in the Northeast lay in the closing of a number of large terminals in the area. Large amounts of stocks were tied up in some of these installations, among them being tanker delivery points.

Settlement Attempt

WSB schedules meeting in hopes of agreement between companies, unions; wage difference narrowed to 3 cents

WASHINGTON.—No signs of impending drastic action by the federal Government were in evidence as the strike of some 100,000 oil workers went into its second week.

Government agencies confined their actions to efforts to bring about negotiated settlements of the wage dispute and to emergency orders for conservation and distribution of available supplies of petroleum products.

Conference Tuesday . . . Representatives of oil companies and unions involved in wage disputes will meet May 13 with the Wage Stabilization Board to report on the success, if any, of their negotiations. Government officials hope that a way may be found to break the deadlock which has tied up more than a third of the nation's oil supply.

The meeting was set last week by WSB Chairman Nathan P. Feinsinger. At the same time he urged union officials to call off the strike and resume work and production immediately and asked both unions and companies to continue bargaining.

Observers noted that it was the first time the board had ever taken action on a dispute while a walkout was in effect. Heretofore, the WSB has refused to consider any case while the workers were out on strike.

There are indications that company and union men will come to Washington principally to listen to the board. This was made clear by the reluctance with which CIO officials accepted Feinsinger's invitation.

O. A. Knight, president of the Oil Workers International Union, expressed regret over the board's action. He said it "might cause an immediate breakdown in negotiations, which have been progressing favorably in some areas."

Toward the end of the week there were no indications that the unions would heed the board's plea to return to work.

Watchful waiting . . . Meanwhile with the strikes threatening military supplies of aviation gasoline, Interior Secretary Oscar L. Chapman was keeping President Truman advised of the situation.

In a midweek review of the situation, Chapman pointed out that even if the strikes do not spread further there will be progressive deterioration of the over-all supply situation as available stocks of products are depleted.

However, to reassure the public, he said that the steps which will be taken by the Petroleum Administration for Defense to conserve supplies will not include any national system of consumer rationing of gasoline. This is largely because of the time element involved in getting such a system under way.

Narrowing gap . . . At the week's end, Washington officials felt that only 3 cents an hour stood in the way of wage agreements throughout the country. The WSB meeting Tuesday apparently is designed to see if this gap between the companies and the unions can be bridged.

The O.W.I.U. and cooperating unions originally demanded an increase of 25 cents per hour in regular pay, plus retroactive payments and some increases in shift differentials. They are now reported to be willing to settle for an increase of about 18 cents an hour with comparable adjustments in fringe benefits.

The companies had offered increases of about 10 cents an hour, which was the maximum permitted under the WSB cost-of-living formula. Many companies are now offering 15 cents, plus the requested increases in shift differentials and various types of retroactive payments.

Any increase above 10 cents an hour would have to be approved by the WSB, but it was generally taken for granted that such approval would be forthcoming.

Conservation measures . . . Other developments in Washington related to the strike included:

1. PAD extended its inventory and export control Order No. 5, originally applied only to the East Coast states, to all states except those in District 5 (California, Oregon, Washington, Nevada, and Arizona).

It ordered a cutback in the consumption of aviation gasoline by commercial airlines and prepared a standby order earmarking specified quantities of suppliers' inventories for emergency use which will be put into effect if vital public services are threatened with interruption.

2. Reports reaching Washington May 7 showed that 51 refineries were shut down, representing capacity of 2,407,300 bbl. daily. However, the situation was changing almost hourly, and there was no completely accurate tabulation of operating plants and volume of throughput.

Wage disputes also existed or were threatened at approximately 50 other refineries with a total capacity of around 1,750,000 bbl. daily. Still other plants faced a threat of shutdown from picketing of certain of their operations.

3. Secretary Chapman renewed his request to the Department of Justice for approval of a setup which would permit the appointment of fact-finding committees to keep PAD advised of changes in the oil situation. Lack of adequate information has hampered PAD in dealing with the problems created by the strike, and while committees could not be set up in time to be of service in this emergency, the situation emphasized the need for better information service.

4. The military services took steps to eliminate all but essential flying and were urged by Munitions Board Chairman J. D. Small to take steps for interservice transfers of petroleum products and such other actions as will stretch available supplies.

Actions Draw Fire

Humble executive blasts Government power drive

HOUSTON.—Centralized government and its actions in usurping individual freedom came in for strong criticism here from Hines H. Baker, president of Humble Oil & Refining Co., at the recent convention of the Natural Gasoline Association of America.

Without referring specifically to the oil strike, Baker criticized the Government for invading the normal field of private enterprise by putting pressure upon industry to give higher wages to employes.

He said the Government has assumed heretofore unheard of powers and continues to grasp for more by using its "emergency" powers to carry out its welfare program.

Reinterpretation . . . The tidelands is an example of an attempt by the Government to reinterpret its powers to justify seizure of portions of the Continental Shelf and the resources therein within state boundaries, he said.

The President's recent claim to "inherent" authority to meet anything he considers to be an emergency without authorization from Congress is just the latest move.

If he is allowed to seize the steel industry because of the labor dispute, to abrogate its contracts with employes,

change its rates of pay, and require a closed shop, then no industry or business in the land is safe from seizure.

Baker said that we seem lost and bewildered by the swift succession of steps through which the Government in the name of emergency has moved into the center of our lives.

Carbon-Black Shift

Cost of natural gas to plants is up from 1 cent to 5.21 cents per M.c.f. in 12 years, so more oil is being used

RAPID increases in the use of liquid hydrocarbons in the production of carbon black resulted in the use of less natural gas for this purpose in 1951 than in any year since the war except 1950.

The annual carbon-black report of the Bureau of Mines shows a decline in consumption of natural gas each year from 485 billion cubic feet in 1947 to 411 billion in 1950. Total for 1951 was 426 billion cubic feet.

The volume of liquid hydrocarbons used in the production of carbon black was first given by the Bureau of Mines as an estimate for 1946 when the total was 20,000,000 gal. First actual reports to the bureau by producing companies were for 1948. Total use for that year amounted to 44,551,000 gal. The bureau's tabulation of reports for 1951 shows an increase of 69 per cent over 1950 for a total of 182,343,000 gal. for the year.

The decided shift toward greater proportionate increases in the use of liquid hydrocarbons has been due to higher gas prices in recent years. Because of the large quantities of gas required, the carbon-black industry operated for many years on gas for which no other market was available.

Gas costs up . . . Postwar expansion programs for natural gas added many large pipe lines, paying higher prices for gas at the well. The average value of natural gas used by carbon-black plants in 1940 was 1 cent per thousand cubic feet. By 1946 the average had moved up to 3.02 cents. The 1951 average was 5.21 cents per thousand cubic feet, or more than five times the average for 1940.

A partial solution to the cost problem was found in the higher yields of carbon blacks by the furnace method, but ordinary furnace blacks did not meet quality standards of some carbon-black users. In recent years, liquid hydrocarbons have been used, either alone or mixed with natural gas to produce some of the finer grades of furnace blacks.

Furnace blacks accounted for 61 per cent of total production in 1951 compared with 55 per cent of the total in 1950 and 49 per cent in 1949.

Sales of carbon black to rubber companies represented 94 per cent of total domestic demand in 1951. Use by rubber companies increased 3 per cent over 1950. A very small gain in sales to paint companies was reported.

CARBON BLACK PRODUCTION
By Processes
(Millions of Pounds)

	Contact	Furnace	Total
1947	654	665	1,319
1948	677	621	1,298
1949	628	596	1,224
1950	617	765	1,382
1951	646	1,031	1,677

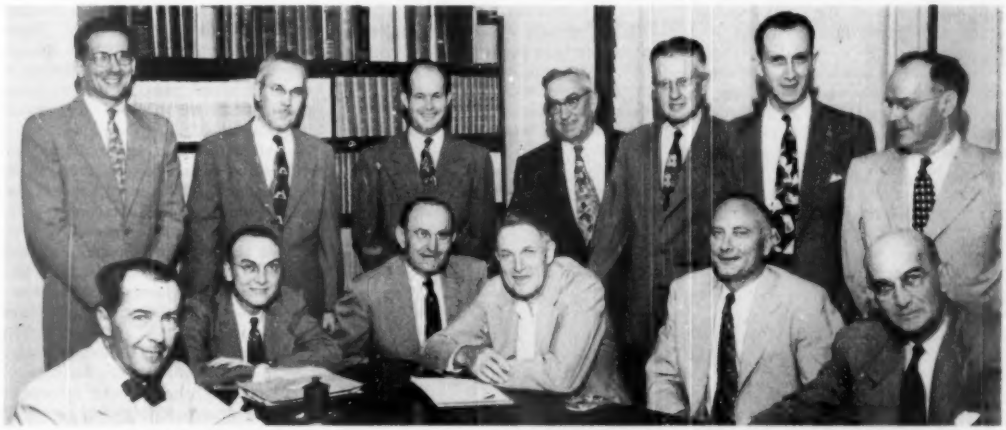
CARBON BLACK PRODUCTION
(Millions of Pounds)

	Texas	Louisiana	Other	Total
1947	896	190	233	1,319
1948	903	165	230	1,298
1949	875	161	188	1,224
1950	949	226	207	1,382
1951	1,150	259	268	1,677

RAW MATERIALS FOR CARBON BLACK PRODUCTION

	Gas used (Billions of cu. ft.)	Value of Gas (Cents per M.c.f.)	Liquids Used (Millions of gal.)	Yield per gal.
1947	485	3.57	31	*
1948	481	4.73	45	3.11
1949	428	4.76	72	2.86
1950	411	4.79	108	3.02
1951	426	5.21	182	2.96

*Not available.



Geological Steering Committee

Making last-minute arrangements for the regional meeting of the American Association of Petroleum Geologists, being held in Tulsa this week, are, left to right, seated around table: Ralph A. Brant, Atlantic Refining Co.; Thomas E. Matson, Manhart, Millison & Beebe; William E. Horkey, Arrow Drilling Co.; Frank R. Clark, general chairman; Charles T. Jones, Stanolind Oil & Gas Co.; and E. Floyd Miller, consultant. Standing, left to right: Philip C. Ingalls, The Oil and Gas Journal; Charles G. Carlson, consultant; V. L. Frost, Ohio Oil Co.; Glenn R. V. Griffith, U. S. Geological Survey; A. I. Levorsen, consultant; John Marshall, Chamber of Commerce; and John G. Bartram, Stanolind. Clark and Levorsen are past presidents of the A.A.P.G. and Bartram is currently vice president of the national association. Paul E. Fitzgerald, Dowell Incorporated, was not present when the picture was taken. The meeting is sponsored by the Tulsa Geological Society.

PANEL MEMBERS at the N.G.A.A. "quiz" session included, left to right, W. M. Waddell, Humble Oil & Refining Co., Houston; Joe Parker, Girdler Corp., Tulsa; G. McClaren, Standard Oil Co. of California, Los Angeles; R. W. Walsh, Petroleum Administration for Defense, Washington; R. D. Rickets, Fish Engineering Co., Houston; H. H. Jones, Sid Richardson Gasoline Co., Fort Worth; and C. P. Stanley, Dresser Engineering Co., Tulsa. The members answered written questions on all phases of the gasoline industry.

Natural-Gasoline Quiz

Panel of experts supplies answers to questions on such industry problems as storage, processing, and testing

HOUSTON. — The huge variety of chemicals which can be manufactured from liquefied petroleum gases leaves the door wide open for natural-gasoline plants to assume a major role in the rapidly expanding petrochemicals industry.

Answering a question addressed to him during a panel discussion at the recent annual convention here of the Natural Gasoline Association of America, H. H. Jones, Sid Richardson Gasoline Co., said some companies using pure components as feed stock have been experimenting with the petrochemical possibilities of the stocks and already are getting into chemicals in a bigger way.

Jones said an executive of one major oil company with whom he'd talk recently feels that the petrochemical branch of his organization will be bigger than the parent oil company in 10 years.

How gasoline plants will figure in the future in petrochemicals was one of a wide variety of questions answered by the panel on government policies, equipment problems, byproducts, and plant operations. (*For panel members see accompanying photo.*)

Among the questions asked the panel, together with the expert asked and the answer, were these:

Q. Are new storage facilities for propane bound to cause an over supply of the product and thereby lower costs?

A. (Jones): It seems that every year about this time, distress signals are raised on the question of overabundance of L.P.G., but when fall arrives the supply and demand usually is found to balance out. This is due largely to the growing use of the product and the selling job being done by the marketers.

The storage of the gas in cavities is good both from conservation and economic standpoint and keeps producers in business. Should a cutback be made on the extraction of propane, it would be diverted to residue gas and this would not be a favorable situation.

Q. What is the best procedure for running a complete test in a natural-gasoline plant?

A. (Jones): There are many different ideas on this. However, my experience is to not regard the plant-balance test as good because too many people are required to run the test successively.

In my opinion it would be better to run unit tests as thoroughly as possible. Then, if it were found that all units were operating as efficiently as possible, it would be reasonable to assume that the plant as a whole was functioning well.

Q. What is the most desirable way to recover ethane—by hypersorption or by low-temperature fractionation?

A. (Jones): Various organizations have made studies of ethane extraction, which poses many problems. Offhand, however, I would say that the refrigeration method is the best for existing ethane.

Hypersorption has proved quite successful for extracting ethylene as done by Dow Chemical Co. in Midland, Mich. When the process was first used, the catalyst attrition rate was quite high, although improvements have since been made. Still, the process is probably expensive for the recovery of ethane as opposed to ethylene.

Q. When a Girbotol or amine gas treater is not functioning, how would the cause for the improper operation of the unit be determined?

A. (Parker): Most people do not consider a Girbotol unit in the same light as a gasoline plant which causes a lot of difficulty in analyzing the troubles. Most difficulties come from lack of reaction in not removing enough hydrogen sulfide. The steps I would recommend are:

1. Check concentration of the rich solution. Initially, however, check the steam supply into the reactivator. This is not a fractionating tower, and high temperature alone is not enough for stripping; steam is required.

2. Check distribution in the column by flooding the tower and noting if reactivation improves. If so, distribution should be corrected.

3. If amine solution reactivation contact in absorber is o.k., then check circulation rate of amine solution, which varies according to the amount of H_2S that is to be removed. Plant operating conditions frequently change from those on which original design is based. In such cases circulation rates may have to be adjusted for actual plant conditions.

4. After the circulation rate is determined to be satisfactory, then check the temperature differential between the amine solution and the incoming gas. Sometimes the incoming gas may be at a higher temperature than required and lowering the temperature would improve operation. However, if the temperature is too low, then reaction time will be too long.

5. Finally, check equipment size, trays, packing, and reboiler surfaces.

In checking the absorber I would make an analytical test for the H_2S going into the absorber and measure amine by titration of lean solution at the inlet of the absorber. If this is 100 g. per gallon or less, sufficient reaction is taking place. If the concentration is higher, the reactor is not stripping out, or there is the possibility of a leak in the heat exchanger Run a similar test

MODERATOR of the N.G.A.A. forum was J. H. Dunn, president of Shamrock Oil & Gas Co., Amarillo, shown here asking a question of the experts.

between the absorber and heat exchanger.

I would also check to determine for sufficient contact in absorber by flooding the absorber (packed tower). If reaction increases, sufficient contact is not being achieved, and the distribution should be corrected.

Q. When the acid-gas stream for the treating unit has too high a concentration of carbon dioxide to support combustion, can sulfur be produced economically?

A. (Parker): Three ways may be used to offset the effects of the high concentration of carbon dioxide.

1. Natural gas may be added to the stream to support combustion. A bad feature of this is that water is a product and forms sulfur to shift the equilibrium of the mixture, decreasing the yield. In addition, larger-sized equipment is required. This has been used successfully, however.

2. You can start with sulfur and make sulfur dioxide to convert hydrogen sulfide into sulfur by adding into the stream. This has been made to work economically, although some difficulties are encountered.

3. You may use selective absorption and treating to increase the hydrogen sulfide concentration.

Q. Under what conditions would an absorber act as a dehydrator?

A. (Jones): In this case, I presume you mean regular gasoline-plant operations and that you have a lean-oil absorber in mind.

In general, the absorber would be doing some dehydrating when running on a high extraction rate with high-pressure, low-temperature conditions and extracting a large amount of ethane or propane. Equilibrium conditions would be such that some dehydration would take place.

A pressure-saturation type of absorber would work in the opposite direction and force water into the residue. The still conditions would be such that if water was not being stripped out, it would be in a saturated stream, and the absorber would not be doing any dehydrating.

A refrigerant-type absorber would also take some water out of the charge.

Q. What type of natural-gasoline facilities are eligible for rapid-amortization certificates, and what are the rates?

A. (Walsh): In general, special facilities like isobutane towers and auxiliaries are eligible for 90 per cent.

Sulfur-recovery plants may be amortized at 70 per cent of cost; gasoline plants in general at 65 per cent; and pipe lines and gathering systems at 40 per cent. Land is not certifiable nor are any facilities classed as production, if the facilities are subject to depletion allowance.

Camps, auxiliaries, and buildings may be certified if, according to the items they are related to, they have no other use except in present location and present use.

Q. What is the present attitude of PAD toward accelerated amortization of natural-gasoline plants?

A. (Walsh): No change in attitude of PAD is evident toward the natural-gasoline industry. The program is still under way for increasing the capacity to produce natural-gas liquids. The agency will continue to recommend until a top limit is set.

Q. On what is the per cent of amortization based?

A. (Walsh): In general, the theory of accelerated amortization is to encourage an organization to build facilities they might not otherwise construct.

Isobutane is a good example. There is little use for it except in wartime, and it would be senseless for the facilities to be installed unless a company were sure of at least getting its investment back. The percentage is based on the type of facility and other plant expenses and auxiliaries involved.

Q. What is the most desirable type of construction contract for compressor stations and gasoline plants?

A. (Stanley): In small or medium-sized jobs where the scope will be well defined, I would favor the turnkey jobs.

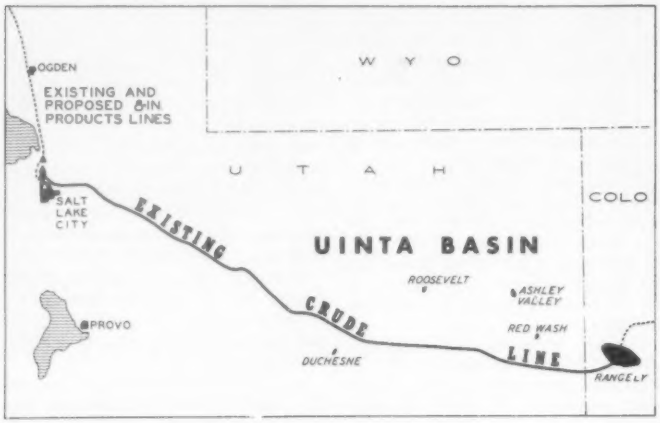
If the job is not well defined, or will stretch out with possible additions as the job progresses, it is usually desirable and advantageous to let the job on some sort of fee basis.

Many contracts have already been let on a turnkey basis for compressor stations and gasoline plants. Usually owner companies have a preference in choice of equipment for the plant. Furthermore, they are best able to foresee any ultimate expansion in the plant and would be best able to judge which equipment would fit their long-range problems.

For the engineering and construction firms, the undesirable feature of a large job on the turnkey basis is the cost and time in preparing an intelligent bid. In addition, it is difficult to determine the contingencies to include for the changing prices over several months.

Emissary of the International Petroleum Exposition

Dr. Oscar B. Irizarry, right, is commissioned an official emissary of the I.P.E. by William B. Way, left, exposition manager, and Opie Dimmick, president of the Tulsa chapter of Nomads. Irizarry is editor of Petroleo Interamericano, Latin American oil magazine published by The Oil and Gas Journal. During a trip through the Latin American countries, Irizarry will extend personal invitations to government officials and representatives of oil companies operating in the Latin countries to the 1953 international oil show, to be held in Tulsa May 14-23.



Uinta Crude Problem

It's too viscous to flow, but Salt Lake refiners count on it for future use; two solutions now being discussed

George Weber

SALT LAKE CITY.—Salt Lake refiners are looking to northeastern Utah's Uinta basin as a major source of their future crude supplies, but there's still one hitch in their expectations.

Uinta crudes found to date contain so much wax that no satisfactory method has yet been adopted to move them to the refineries in volume.

Two temporary expedients have been used, but together they move a relatively small amount.

One method is tank-truck delivery to refineries, which is uneconomic and which at present is prohibited by the Utah Highway Department because of the poor conditions of roads in the area.

The second is blending the viscous crude with Rangely field crude and piping both to Salt Lake. About 1,200 bbl. daily is now reaching Salt Lake City, trucked from Red Wash field to Rangely and blended with Rangely crude. It is estimated that possibly twice this amount could be blended without plugging the line with wax.

The answer to the problem apparently lies in a choice between two principal possibilities: Construction of a heated-oil pipe line, or visbreaking or thermal cracking in the field.

Uinta's importance . . . At present refiners in and around Salt Lake City, the Rocky Mountain area's largest refining center, depend on Rangely crude and that of smaller fields of southwestern Wyoming. As this production declines in coming years, Uinta crude promises to provide a new regional source to meet increased product demands of the intermountain region and the Pacific Northwest.

While the Uinta crudes contain relatively little straightrun gasoline, they are in demand by established Salt Lake refiners because they have a low sulfur and constitute good cracking stocks. But, the wax content of the Uinta crudes is high, and pour points range up to 115° F.

Transport solutions . . . One sure way to move the viscous crudes would be by construction of a heated-oil line.

This admittedly costly project would parallel the existing Salt Lake Pipe Line Co. crude line from Rangely. It would cross the high Wasatch Range and would reach an elevation above 9,000 ft. at one point.

Although this section is subject to extreme subzero winter temperatures, atmospheric temperatures would have little effect on the buried line.

Operators of the Salt Lake line report that Rangely crude actually picks up about 2° in transit to Salt Lake City during the coldest weather. This is explained by the fact that the buried line is further buried early in winter by a thick snow cover which insulates the ground effectively from the much-lower atmospheric temperatures. Thus, heat absorbed by the rocky terrain during the sunny summer of the region is retained through the winter.

The other possible method of moving Uinta crudes, that of visbreaking or thermal cracking in the field, also is undergoing study now.

Object of this technique, of course, would be to crack enough of the wax fraction to reduce viscosity of the crude to a point permitting movement in an unheated pipe line.

Field dewaxing also has been considered, but the total lack of a local outlet for wax largely rules out this possibility.

No solution has been selected yet by any of the companies interested in producing and processing the crude. From the refiners' viewpoint, the problem has no immediate urgency, since Rangely and other fields are now meeting their needs.

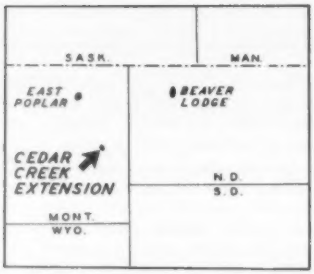
Uinta outlook . . . As these latter crudes decline in availability, however—and barring the discovery of more easily handled crudes equally close—refiners will have to depend more and more on Uinta production. Long before then, it is expected that Uinta production will be moving to Salt Lake City by one means or another.

For the present, however, the Uinta picture is one of modest activity. With no large outlet, together with the problem of actually producing the viscous oil, there is no rush to develop the area.

CHARACTERISTICS OF REPRESENTATIVE UINTA CRUDES

Field— Well—	Red Wash California Co. No. 1 Red Wash	Duchesne Carter Oil Co. No. 1 Ute Tribal	Roosevelt Carter Oil Co. No. 1-A Ute Tribal
Gravity, °A.P.I.	28.0	44.3	31.0
Sulfur, wt. %	0.12	0.05†	0.56
Pour point, °F.	+95	+115	+90
390° F. E.P. gasoline, %	11.13	16.5†	15.5
Residum after 400 vis. kero.,%	82.1	72.7	70.45*

*After 500 E.P. distillate. †Average.



Williston's Best

Shell's Cedar Creek well tests 3,500 bbl. per day

GLENDIVE, Mont.—Biggest well in the Williston basin is the title being given Shell Oil Co.'s new discovery near here.

The well, a northwest extension to The Texas Co.'s Cedar Creek discovery in C NE NE 35-15n-54e, flowed 3,500 bbl. per day through a ¾-in. choke from perforations between 8,968 and 9,077 ft. after acidizing.

Earlier the well had flowed at a rate of 2,200 bbl. daily through the same choke from perforations between 8,861 and 8,698 ft. after acid treatment. The producing formation is Devonian.

Before the acid treatment which resulted in the 3,500-bbl. test, the well had flowed at a rate of 750 bbl. per day on a ¾-in. choke natural. The well, Shell's 34-26-G in NW SW 26-15n-54e, has a total depth of 9,202 ft. with casing set on bottom.

The Texas Co.'s discovery well at Cedar Creek had an initial production of 254 bbl. of oil daily from a zone between 8,745 and 9,079 ft. Devonian in this well was topped at 8,542 ft.

In the basin's East Poplar area, C. C. Thomas et al finished cementing casing at the 1 Huber, a mile southwest of the East Poplar discovery, after finding saturation in three zones—5,500-20 ft., 5,610-18 ft., and 5,626-40 ft. Ajax Oil Co. also was running casing last week at its wildcat in the West Poplar area.

Some oil was found on a drill-stem test by Shell Oil Co. in its 1 Little Beaver, a wildcat about 75 miles southeast of Cedar Creek Ordovician field. The test was of the interval between 6,820 and 6,846 ft.

New Colorado Discovery

DENVER.—The first oil discovery in Washington County, Colorado, is indicated at Kimbark Co. 1 Ward in the central part of the county.

Recovery on a 45-minute drill-stem test of the "J" sand was 2,525 ft. of oil and 75 ft. of water. Test was made of the zone 4,790-4,800 ft., with additional saturated sand found below the zone tested.

The new discovery is located in an area south and east of previous producers in the Denver-Julesburg basin.

Three New Oilers Completed

WILLISTON, N. D.—Three more completions were reported for North Dakota last week, and Amerada Petroleum Corp. announced three more locations.

Amerada completed its 1 Dilland, a deep test in Beaver Lodge field, for an initial flow of 515 bbl. daily through a choke. The well went to 13,325 ft. but was plugged back for completion in the Madison.

Also in Beaver Lodge, the Rudman-American Viking-Tioga Petroleum 1 Math Iverson was brought in for 24 bbl. per hour from the Madison at 8,565 ft. after being plugged back from a total depth of 12,000 ft.

In the Tioga area, Amerada completed its 1 Harry Bakken for 25 bbl. an hour on a ¼-in. choke. The well, 11 miles north of the closest Beaver Lodge production, was completed at 12,490 ft. after drilling to a total depth of 13,709 ft.

Of Amerada's three new locations, two were in Beaver Lodge and one in the Tioga area.

Utah Extensions Indicated

SALT LAKE CITY.—Two important extensions in the Duchesne and Roosevelt areas in Utah are flowing oil on production tests.

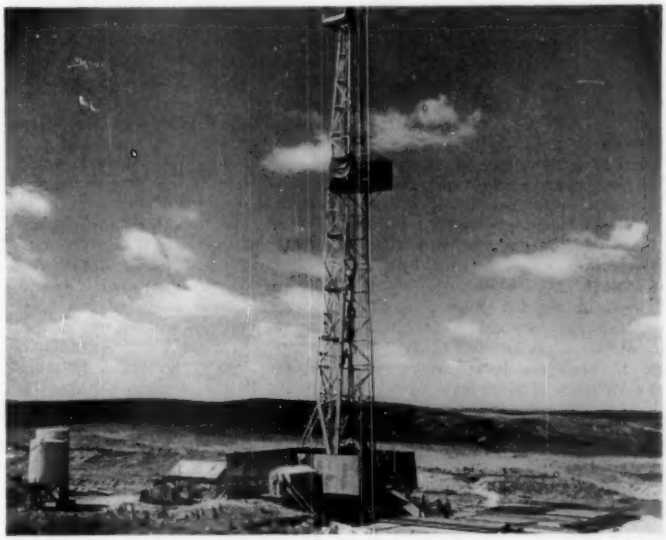
At Duchesne, Carter Oil Co. and Continental Oil Co. 2 Ute-Tribal, ½ mile west of the field discovery well, flowed 140 bbl. of oil in 140 minutes, then 30 bbl. in 20 minutes following acid treatment in basal Green River.

The discovery well at Duchesne was completed for 538 bbl. of oil daily.

In Roosevelt field, Gulf Oil Corp.'s 2-mile northeast extension flowed 398 bbl. of oil in 10 hours—an initial production estimate of 1,000 bbl. daily from basal Green River fractured shale.

Nebraska Strike Completed

SIDNEY, Neb.—Completion of a wildcat discovery in Kimball County by Vaughey & Vaughey was announced last week. The company's 1 Goodwin pumped 262 bbl. of 38°-gravity oil through choke in a 24-hour test. Production is from the interval 6,040-47 ft. in the "J" sand.



Gas in the Salt Plains

Sunray Oil Corp. last week announced completion of its 1 Wolf, a significant gas discovery near LaVerne, in Harper County, Oklahoma. The well, located in an area of exciting exploratory activity, flowed 5,200,000 cu. ft. of gas with 47 bbl. of distillate per day through a 1-in. choke from perforations at 7,190-7,230 ft. Completion was in the Morrow (Pennsylvanian) sand. The discovery followed closely the strike of Continental Oil Co. in Major County 66 miles to the southeast. It is 42 miles southeast of the Flynn discovery in Beaver County.

Progress to Build Line

1,100-mile big-inch crude line from Odessa to Los Angeles to be built regardless of West Coast plans, Leh declares

D. H. Stormont

LOS ANGELES. — Progress Pacific Pipeline Co. intends to start construction of a crude-oil pipe line from West Texas to California as soon as controls on steel pipe are lifted.

The line will be built whether or not West Coast Pipe Line Co., Dallas, goes ahead with plans for its line between the two areas.

In almost these words Marc D. Leh, who with D. E. Brown heads Progress Pacific, let it be known last week that the company's plans have not been abandoned in spite of the fact that West Coast already has been authorized by the Petroleum Administration for Defense to build a 20 or 22-in. carrier from Wink, Tex., to Norwalk, Calif.

The California company's plans call for a 24-in. crude line from a point near Odessa to the Los Angeles Harbor area. Initial capacity of the 1,100-mile line would be 225,000 bbl. daily.

Design work and a preliminary survey of the line and of a paralleling 12¾ to 16-in. products carrier, already have been completed by Ford, Bacon & Davis. (*The Oil and Gas Journal, June 14, 1951, page 59, and December 21, 1950, page 145.*)

Economics . . . Leh explained the proposed lines would act as common carriers and would be privately financed. No government aid or accelerated amortization would be required, he said, adding that the economics of the project did not make such aid necessary.

In discussing this phase he pointed out that for 38° and lighter crudes, actual field prices for West Texas crudes are 35 cents per barrel below those in California. It is planned to charge shippers about 27 cents per barrel for the long haul, plus gathering and distribution charges. Thus, Leh said, California refiners could receive West Texas high-gravity crudes at a price equal to or below those posted for similar-gravity local crudes.

Questioned as to reports that West Texas did not have sufficient excess crude-producing capacity to supply a California line—much less two lines—Leh said a survey conducted by a Houston engineering concern showed otherwise.

This study, he said, revealed that when the two new Gulf Coast lines are supplied, West Texas fields still would be capable of efficiently producing in excess of 1,000,000 bbl. daily of additional crude if field allocations were raised by the Railroad Commission.

Refiners' problem . . . If independent California refiners and marketers can receive West Texas crudes at comparable prices, its availability may bring about the reopening of several shutdown plants and cause a minor modernizing and expansion surge.

Because of the tight crude situation existing on the West Coast, independent refiners are having difficulty obtaining sufficient crude supplies.

For the same reason marketing companies engaged in selling "rebranded" gasoline supplied by major refiners also will benefit. Several years ago, when they had excess refining capacity and gasoline did not require the degree of processing it does today, to keep their plants busy the larger companies were willing to supply the solely-marketing companies with their product needs.

In most cases the large companies now do not look with favor on this class of business. Thus when contracts for supplying gasoline and products to the "rebrands" come up for renewal, the latter no longer are able to secure the favorable terms they did 5 years ago.

What California Needs

More emphasis should be put on secondary recovery to assure continued high oil production, report warns

WASHINGTON. — Secondary-recovery methods will yield an economic return in at least some sections of California and, in fact, must be given increasing attention if the state is to maintain its high rank as a petroleum producer.

These conclusions were reached by Bureau of Mines engineers in a report on gas and water-injection investigations made during 1950 in cooperation with the oil industry.

Part 2 of Report of Investigations 4887, "Recovery of Oil in California by Secondary Methods," dealing with the Los Angeles Basin and coastal oil fields, has been published and copies may be obtained without charge from the bureau's publications - distribution section, 4800 Forbes Street, Pittsburgh 13, Pa. Part 1, dealing with San Joaquin Valley, will be released shortly.

Gas injection economical . . . Field operations described in the report have demonstrated conclusively the economic value of secondary recovery in California by gas injection, according to the authors of the report, A. G. Loomis and D. C. Crowell, petroleum engineers; and A. N. Fried, chemical engineer.

However, they say, no such definite statement on water flooding can be made at this time because of the few experiments that have been made toward solving its many complex problems. Most engineers in the state, nevertheless, believe the future of water flooding is promising and should not be summarily rejected on the basis of any comparison with reservoir conditions in the eastern and Mid-Continent areas, because conditions in those areas also are far from ideal.

Recognizing these differences, the report commented that "it is inevitable that the economic recovery of additional oil in California by secondary methods will require considerable modification of the methods generally established in the Appalachian and Mid-Continent areas. Some areas of California may require development of entirely new methods for economic oil recovery."

Water-flood problems . . . Some difficulties are encountered in repressuring in water flooding the thick, nonuniform sands in the California oil areas, the bureau engineers reported. These sands are sometimes faulted and lensed; they have extreme variations in permeability, and yield very viscous oils. The presence in some sands of argillaceous material that swells on contact with water also presents a difficult problem in water flooding.

Most of the current secondary-recovery operations in the state, it was found, are of the pressure-maintenance type.

The possibilities of recovering additional oil from stripper fields by gas drive and water flooding, including water disposal, also are being tested in experimental field projects.

"Although secondary-recovery methods have been applied widely in California, it is apparent that increasing attention and effort must be given to this phase of recovery if the state is to maintain its high rank as a petroleum producer," the report concluded.

Oil Shortage by 1955

Few discoveries, scarcity of good proved locations show California production will not meet demand, Minckler says

SAN FRANCISCO. — "We have enough oil in California for a very few years more, but I believe we are approaching finally the day when there will be a shortage of over-all local crude-oil production. I would put the date at 1955."

This is how Robert L. Minckler, president of General Petroleum Corp., sized up possibilities of the West Coast remaining self-sufficient. He was speaking here before a meeting of the National Federation of Financial Analysts Societies on May 5.

Reasons for shortage . . . Pointing out that California is in the process of changing from an economy of surplus to one of balance and then to one of shortage, he said this trend is due to two principal causes:

1. The industry has failed to find enough important oil fields to maintain its reserves position.

2. Production is failing to keep pace with the terrific increase in demand.

However, Minckler cautioned, the currently acute oil supply situation should not be used as a basis for drawing conclusions as to the long-range position. The current short supply on the West Coast has been due to greater demands related to the Korean war and to the loss of Iran as a source of supply for world markets.

Normal demand in '54 . . . Minckler predicted that total normal demand in the natural market area for the West Coast will be about 1,040,000 bbl. daily in 1954.

Of this amount, civilian demand would account for about 915,000 bbl., military demand for about 100,000 bbl., and offshore demand for another 25,000 bbl.

Area imports and natural-gas liquids, he estimated, will supply about 135,000 bbl. of the total, thereby requiring California wells to produce at least 905,000 bbl. daily.

Current production of crude in California, about 980,000 bbl. daily, is near capacity, he said. While this does not leave any big surplus over crude requirements to meet demands in the natural market area, it does not indicate an immediately critically short condition.

"We now have a pretty small inventory of high-grade undrilled proved locations, and even an accelerated development drilling campaign to the level of 1948 would not run our efficient production capacity to over one million barrels per day," Minckler said.

On the question of new reserves he said: "The record of discoveries in California in the past few years is not encouraging. The only first-class oil field found during the past 10 years is Cuyama, and even Cuyama looks small when measured against a demand of 1,000,000 bbl. per day."

Production sources . . . The two important production possibilities, the Elk Hills Naval Reserve and probable discoveries offshore, were listed as doubtful sources of supply as long as they remain political issues.

Minckler rated the new Alberta oil fields as the most likely to become an early source of extra supply for the West Coast.

Use of Canadian oil as a source of supply for the West Coast would promote development of an oil-refining industry in the Pacific Northwest.

"After Canada, I would rate the Uinta basin of eastern Utah as the most likely source of extra supply for our area," Minckler said. "Other possible sources of important volumes of crude for our area are the western part of the Rocky Mountain region, eastern Nevada, and the San Juan basin of New Mexico, Colorado, Utah, and Arizona."

Refining capacity . . . While there is a statistical surplus of refining capacity on the West Coast, the quality of this surplus is poor, consisting mostly of straightrun units that cannot profitably operate under current crude and product prices.

"I do not believe that there is any over-all excess efficient refining capacity in this district," he said. "Some new capacity is now being built, and additional capacity will be built, probably in the Northwest."

Major Discovery

Union's Sespe pool opener finds 1,600 ft. productive

VENTURA. — The deep Sespe zone pool discovered by Union Oil Co. in Torrey Canyon field of Santa Clara Valley has been rated by the company as being of major importance.

The discovery, 83 Torrey, currently is pumping and agitating 18.5-gravity crude at the rate of 650 bbl. daily. While pumping equipment was being installed the well started to flow through casing at a 30-bbl.-per-hour rate, but it soon became evident there was insufficient gas to cause the well to flow at capacity rates.

Bottomed in nonmarine Sespe sands at 9,327 ft., the pool opener drilled through a 1,600-ft. productive section before the rig's capacity prevented further hole making. The fact the sand's productivity improved with depth and has yet to be completely penetrated caused company officials to be highly optimistic as to the discovery's importance.

Shallow Sespe sand production was established at Torrey Canyon at about 2,500 ft. in 1889. Subsequent attempts to find deeper production found the Sespe formations to run 6,000 to 7,000 ft. thick before encountering marine Eocene.

Just why 83 Torrey encountered such thick section of Sespe, from the surface to total depth, is not yet known. Duplication due to faulting, with production coming from below the overthrust Oak Ridge fault, is the most suspected cause. The unusual thickness may be due to thickening, however.

Union, with 30,000 acres in fee, has the largest holdings in the vicinity of the new discovery. Among other companies with holdings are The Texas Co., 1,300 acres slightly over ½ mile west, and Oceanic Oil Co., with 2,200 acres about ¾ mile to the north.

Harbor Oil Revenue High

LONG BEACH.—The city of Long Beach has received a total of $14,022,612 in oil revenue from harbor properties developed by Richfield Oil Corp. from Pier A. The 91 wells there currently are producing about 12,200 bbl. daily.

Total proceeds from this development since 1947 has been $22,304,903. The amount received by the city represents 62.87 per cent royalty, whereas Richfield, as contractor, has received 5.9 per cent royalty or $1,315,989. To cover the cost of drilling and produc-

tion. Richfield has been reimbursed 31.35 per cent, or $6,966,301.

During the fiscal year ended June 30 these properties yielded the city $5,923,474, Richfield $520,997, and $2,384,922 (27 per cent) was invested in drilling and production expenses.

Under the terms of Richfield's contract, which will run 20 more years, "reasonable and necessary" drilling and operating costs shall not exceed 34 per cent of the gross income.

Elk Hills Probe Asked

WASHINGTON.—An investigation to determine what part, if any, has been played in the handling of the Elk Hills Navy oil reserve by Clark Clifford, former special counsel to the president and now representing Standard Oil Co. of California, has been asked of the House armed-services committee by Rep. Paul W. Shafer of Minnesota.

Shafer said he wants the investigation to find out if the administration plans any change in the status of the reserves.

A plan for the exchange of its interest in the shallow zone for oil in the deep zone was submitted to the Navy some months ago by the company, and the Petroleum Administration for Defense also suggested some time ago that the department might increase production there to help meet the shortage on the West Coast.

GULF COAST

Florida Rebuff

Government won't give up park land mineral rights

WASHINGTON.—Interior Secretary Oscar L. Chapman will inform the Florida state authorities within the next few days that the department cannot relinquish the mineral rights in the state-dominated lands in Everglades National Park without instructions from Congress.

The matter was brought before the department last month by former Florida Supreme Court Justice Rivers Buford, who represents clients who would like an opportunity to lease mineral rights in the park and explore for oil.

About a million acres of land, approximately half of it under water, was given the federal Government by the state for the park, which also includes some land purchased from individuals.

Background . . . The former owners of the purchased land were permitted to retain their mineral rights until October 1958 and until then have the right to drill for oil.

The state originally reserved its mineral rights but relinquished them at the insistence of the federal Government. The deed transferring the land for park purposes provides for royalties to the state if oil or other minerals should be discovered, but exploration and development of those resources must be authorized by the United States.

The state authorities are seeking only the same terms as apply to former privately owned lands, the right to explore for oil until 1958. Chapman, however, will remind the state authorities that federal property can be disposed of only under authority from Congress, and he is not expected to offer support for any legislation which the state might ask of Congress.

The nearest and only production in Florida is about 50 miles distant from the park in Sunniland field in Collier County, where Humble Oil & Refining Co. has 12 producing wells and an average production of 1,700 bbl. daily.

Petrochem Plant Announced

NEW ORLEANS.—American Cyanamid Co. will build a $50,000,000 plant near here for the production of chemicals from natural gas, K. C. Towe, president, revealed last week.

The new plant, for which a certificate of necessity was recently issued, will be located on a 600-acre site in Jefferson Parish, Louisiana, about 10 miles above New Orleans. Natural gas for the project will be supplied by The Texas Co.

As initially projected, the plant will produce ammonia, acetylene, hydrocyanic acid, and derivatives of these products. Among them acrylonitrile and ammonium sulfate. These basic materials provide a foundation for eventual production of a wide range of both hydrocarbon and nitrogen chemicals for industrial use and agricultural purposes, American Cyanamid said.

In the initial stage of its operation, the plant will employ about 400 persons.

The Louisiana site offers the company various advantages, including availability of natural gas, a year-round supply of process water from the Mississippi River, transportation by river, highway, and two railroads, a favorable climate, nearby markets in the textile and rubber fields, and an excellent source of operating personnel. The friendly attitude of state and local officials also was a factor.

Construction of the plant will be supervised by Chemical Construction Corp., a Cyanamid subsidiary. A general construction contract has been let to J. A. Jones Construction Co., Charlotte, N. C.

Hurricane Warning

FCC studying plan to alert Gulf plants of disturbances

WASHINGTON. — Refineries and other industrial plants on the Gulf Coast will shortly have the protection of radio hurricane-warning service if the Federal Communications Commission approves a proposal submitted by the Gulf Industries Weather Network.

Gulf Industries is a nonprofit association of petroleum and chemical companies organized in 1950 to furnish radio-communications service to the weather bureau.

Its proposal calls for a six-station emergency network along the gulf to gather and disseminate weather information during critical and emergency periods or when land line communications upon which the weather bureau depends have been disrupted or are overloaded.

Why it's planned . . . The service is designed to secure maximum output of the industrial plants for the civilian economy and the defense effort by allowing those in danger territories to operate as long as possible before critical weather envelops them. It would assure otherwise hesitant employes that they may remain on their jobs without peril until advised by up-to-the-minute radio reports to seek safety.

The three primary purposes of the system would be (1) to provide "back-up" communications between weather bureau offices when existing land lines fail or become overloaded, (2) to disseminate information regarding unusual weather conditions during emergency periods, and (3) to gather vital information and data regarding unusual weather conditions.

No other use of the network is contemplated except such as may be dictated by a possible disaster of some sort.

for a Cooling Tower

Report on FUNGI DETERIORATION

Results of field and laboratory research on fungi deterioration in cooling tower lumber have been compiled in a technical report, now available, without obligation, from Nalco. Report includes data on investigational findings, control and prevention methods, evaluation of results, and types of treatment. Ask your Nalco Representative for a copy, or write direct.

WHEN the ice pick plunges through a structural member as though it were paper, fungi deterioration has struck a heart blow at another cooling tower. Yet, if the infection has not brought about actual lumber collapse, there is a good chance Nalco can save the tower.

Basic Nalco 33 and 21-S treatment for recirculating cooling water systems prevents scale, corrosion, and delignification; effectively controls slime and algae. It will also *stop* fungi deterioration when chemical dosages are adjusted for this purpose.

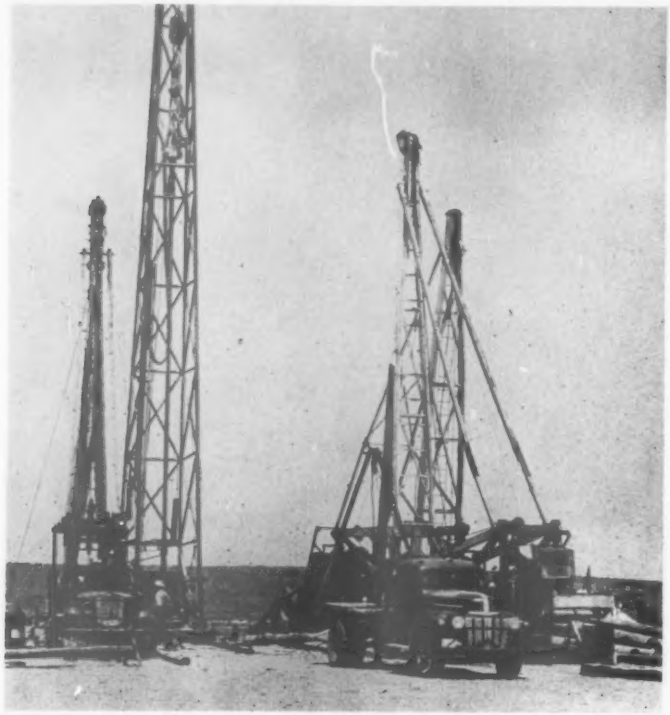
Preventing fungi infection is much simpler and safer than combatting it:

Nalco records indicate no cooling tower treated with Nalco 33 and 21-S has ever been attacked.

Act now to protect your cooling tower investment with the Nalco System.

NATIONAL ALUMINATE CORPORATION
6242 W. 66th Place • Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario, Canada

THE *Nalco* SYSTEM... Serving the Petroleum Industry through Practical Applied Science



DRILLING FREEZE HOLES.—Three spudders and a light rotary at work on the 28 freeze holes drilled around the spot where a 17-ft. shaft was to be sunk. Shortly afterward, the cable-tool rigs were moved out and two more rotaries put to work.

Rotary Rigs Save Mine

Oil equipment helps a Potash company sink a shaft to its deposits by freezing off a troublesome water formation

CARLSBAD, N. M.—Rotary drilling was used to good advantage in coping with an unusual problem encountered in the sinking of a ventilation shaft at The Potash Co. of America mine 20 miles northeast of here.

Prolific water sands above the 350-ft. level had defeated all previous attempts to dig the shaft to the potash deposits at a depth of 725 ft.

Using light rotaries the problem was solved by drilling a circle of "freeze-holes" around the shaft and pumping brine down the cased wells. When the enclosed cylinder was frozen the shaft then was dug through the water sands and a 15-ft. concrete liner set.

Two attempts were made by the owner to sink a shaft by conventional mining methods, but in each case the water flow was so great, and the sands so unstable, that the shafts had to be abandoned. In one shaft the water flow was measured at well over 1,000-000 gal. daily. Several thousand sacks of cement were pumped into the hole in an effort to seal off the water sand but to no avail.

A contract was negotiated with Winston Bros. Co., Minneapolis, Minn., to sink a shaft by the freezing method. In a circle around the shaft it was decided to drill 28 freeze holes. As the success of the freezing operation would depend to some extent upon correct spacing at the bottom of the wells, it was necessary to drill them as nearly vertical as possible.

Three spudders were put to work at first, but after drilling about 10 holes, some of which later had to be redrilled, it became apparent they could not drill the holes sufficiently straight or rapid. Three small rotary rigs then were hired; they did the job successfully.

In each case an 8¾-in. hole was drilled to a depth of about 350 ft. To assure they were being kept vertical, deviation readings were taken at 20 to 40-ft. intervals. In this manner all wells were drilled with less than 1° deviation from vertical. Most of them were off less than 0.5°, the horizontal displacement at bottom being 2 ft. or less. More than 700 readings were taken in drilling the freeze holes.

After each hole was drilled 7-in. casing, with the lower end capped, was run to the bottom. In each hole 2½-in. tubing also was run almost to bottom.

The surface end of the tubing then was tied into a brine circulating manifold, with the brine being circulated down the tubing and back through the annular space between the tubing and casing. A compressed ammonia refrigerating unit, was used to cool the brine.

In order to observe when the formation had been frozen, a test hole was drilled in the center of the shaft site. At the end of 48 days of freezing, the formations were solid to the 350-ft. level. The shaft then was sunk through the water zones without difficulty and the 18 to 22-in. thick concrete liner set while the sands were kept frozen.

CANADA

Avgas Shortage Possible

TORONTO. — George L. Stewart, president of Imperial Oil, Ltd., said last week that the oil strike in the United States will not cause a shortage of automotive gasoline in Canada.

Aviation gasoline, however, is another story, and the supply situation here could become acute if the strike lasts for any length of time, he said.

Sun Planning Products Line

SARNIA, Ont.—Sun Oil Co. last week was reported planning construction of a products pipe line running from Sarnia to London and Toronto.

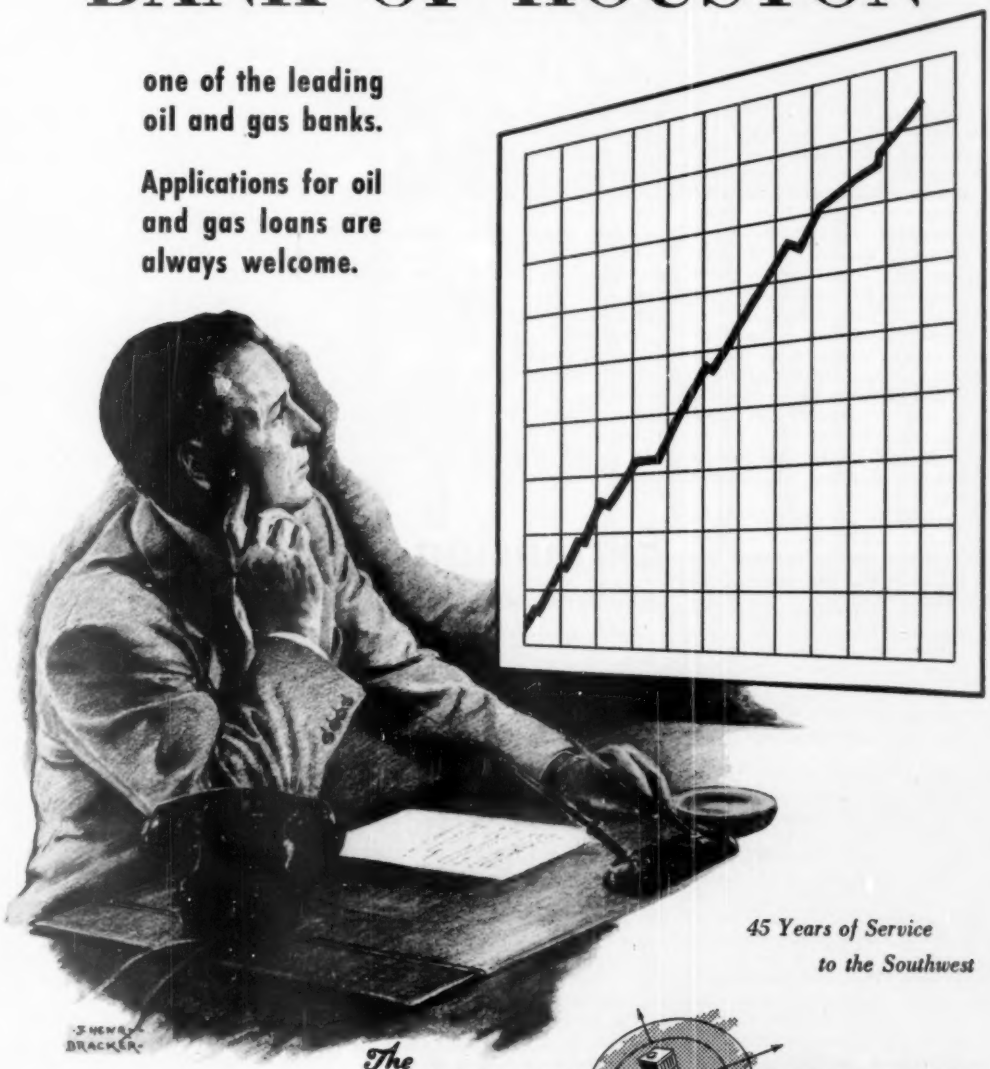
The line would carry products from the company's 10,000-bbl. refinery now under construction at Sarnia. Tentative plans call for construction to begin next year on the line.

Consistent Growth in Oil and Gas Loan Volume Has Made

THE SECOND NATIONAL BANK OF HOUSTON

one of the leading oil and gas banks.

Applications for oil and gas loans are always welcome.



45 Years of Service to the Southwest

The SECOND NATIONAL BANK OF HOUSTON

MAIN AT RUSK — CAPITAL AND SURPLUS 15 MILLION DOLLARS

Member Federal Deposit Insurance Corporation

About Face in Steel

Lost production, small inventories, higher drill-pipe quota minimize chances for sufficient last-quarter tubular goods

Bertram F. Linz

WASHINGTON. — The Petroleum Administration for Defense has allocated 262,187 tons of oil-country tubular goods for third-quarter use by 1,532 oil and gas operators.

Applications from 732 other operators, 16 of them "B" operators who normally drill 40 or more wells a year, were denied, as were two applications for pipe for miscellaneous purposes.

A breakdown of the PAD allocations shows that 166,170 tons of casing and tubing went to 133 "B" operators and 96,017 tons went to 1,399 "A" operators, who normally drill fewer than 40 wells a year.

In addition, however, the usual 22,200 tons of tubular goods was set aside for emergency field stocks, used almost entirely by smaller operators in drilling wildcats. Therefore "A" operators in effect will get 118,217 tons, or 42 per cent of the total tonnage available for other than miscellaneous purposes.

In addition to the above, PAD set aside another 3,289 tons for 16 operators for the drilling of brine and sulfur wells and other miscellaneous purposes.

Supplements later . . . These figures cover the primary allotments of the steel received by PAD from the Defense Production Administration, and supplemental allotments will be made later as will allotments of conversion pipe.

In announcing the figures, Deputy Administrator Bruce K. Brown warned operators against taking a too-optimistic view of the steel situation.

"Until the steel strike many people had been saying that steel was in plentiful supply," Brown pointed out. "Some, even in the oil and gas industries, had been speaking of our having steel 'coming out of our ears' in a short time. Whatever may be true of other fields, such talk certainly finds no support in the mobilization field for which PAD has responsibility, as these allocations testify."

The steel strike can only make matters worse from the supply standpoint, Brown added. PAD, he said, estimates the loss of tubular-goods production resulting from the short interruptions of steel operations at roughly 5,000 tons for each day of shut down. A new strike (such as appears possible if the Supreme Court holds the President to be without seizure powers) might cut even more deeply.

Below needs . . . Total requests to PAD for third-quarter allocations were 1,178,000 tons of steel. After weeding out ineligible applications, it was necessary to cut 40 per cent below the operators' needs, as calculated by PAD standards, in making the distribution. However, it is hoped that through supplementary allotments and the use of some 50,000 to 60,000 tons of conversion steel it will eventually be possible to supply a full 100 per cent of the calculated needs.

"This assumes, of course, that steel production is not again interrupted," Brown qualified. "If it is, supplemental allotments will have to be adjusted to take account of production losses resulting from the strike.

"What is more, the outlook for the fourth quarter is no brighter, and the actual conditions may be even less bright," he added.

Fourth-quarter picture . . . Brown explained that several factors enter into the fourth-quarter picture:

1. Operators no longer have available to them any large quantities of second-hand, imported, or inventory pipe such as they have had in the past and are relying more than ever on PAD allotments.

2. Some quantity of production, although minor, was lost in the cooling off periods at the mills which preceded the two brief shutdowns.

3. Even more production has been lost through mill slippages in general and through the closing in of one eastern mill that had been supplying about 17,000 tons of pipe a quarter.

4. Finally, PAD has been forced to increase the production of drill pipe by some 1,850 tons in the third quarter at the expense of production of small-diameter casing and tubing.

"It is not an encouraging picture," Brown said, "but it is a picture whose outlines have been dictated by the materials situation, not by PAD's wishes in the matter."

Expansion Approved

Accelerated amortization granted by DPA for additional 39 oil-industry projects for sulfur, gasoline, pipe lines

WASHINGTON. — A petrochemical plant to cost nearly $15,000,000, a high-octane-gasoline facility to cost $11,000,000, and a pipe line costing more than $10,500,000 are among 39 expansion projects in the oil and gas industry for which the Defense Production Administration issued certificates for accelerated amortization during the first half of April.

The petrochemical plant is to be built at Baton Rouge, La., by Esso Standard Oil Co., which was granted certificates for quick write-off of 65 per cent of $8,780,000, 50 per cent of $1,790,000,000, 35 per cent of $3,466,000, and 15 per cent of $697,000.

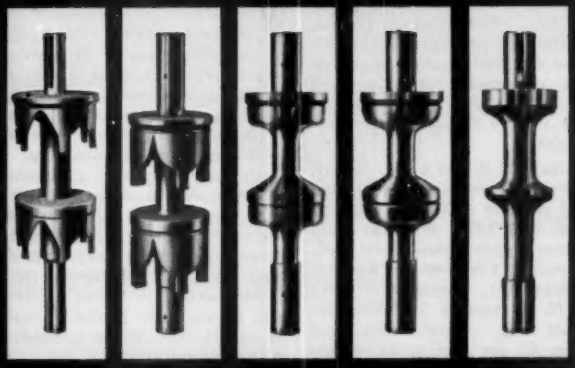
The new gasoline facilities will be installed by Magnolia Petroleum Co. at Beaumont and Corpus Christi, Tex., and the company has been granted 90 per cent of $732,000, 65 per cent of $7,820,800, and 40 per cent of $2,495,200.

The pipe line, on which accelerated amortization is approved for 15 per cent of the $10,588,000 cost, is the 14-in. products line of Shell Oil Co. from Wood River to Chicago and Argo, Ill., to be completed toward the end of this year, with an initial capacity of 85,000 bbl. daily. Petroleum Administration for Defense has allotted 6,238 tons of line pipe for third-quarter construction.

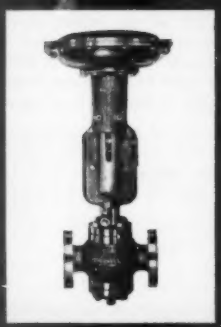
Other projects . . . approved by DPA include the following:

Esso Standard Oil Co., Linden, N. J., sulfur, 70 per cent of $1,290,000 and 40 per cent of $260,000; Socony-Vacuum Oil Co., Inc., Paulsboro, N. J., synthetic bead catalyst, 75 per cent of $1,618,000 and 50 per cent of $325,000; Standard Oil Co. (Ohio), Lima, propane and butane, 65 per cent of $1,050,000; Michigan Gas & Electric Co., Holland Township, Michigan, natural gas, 50 per cent of $82,776; Sun Oil Co., Toledo, gasoline, 65 per cent

WIDE SELECTION . . .



for any valve application



Discs for the Honeywell Series 700 Valve include single and double-seated V-ported and contoured types, each with either linear or equal-percentage characteristics, plus a flat disc for on-off control . . . all ground and polished . . . all designed to retain characteristics under severe service. The Honeywell Series 700 Valve comes in a full range of styles and sizes . . . has *all* the features you look for in a fine valve. Write today for your copy of Bulletin 700-2. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Avenue, Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
VALVE PRODUCTS

H HONEYWELL

First in Controls

of $5,063,000 and 40 per cent of $1,332,000.

Cities Service Oil Co., East Chicago, Ind., gasoline, 90 per cent of $130,700, 50 per cent of $12,000, and 15 per cent of $32,300; Farmers Union Central Exchange, Laurel, Mont., gasoline, 65 per cent of $2,944,899 and 45 per cent of $435,409; Socony-Vacuum Oil Co., Inc., Augusta, Kans., gasoline, 90 per cent of $475,500, 65 per cent of $2,292,000, and 45 per cent of $237,500; Panhandle Producing & Refining Co., Wichita Falls, Tex., crude oil, 65 per cent of $189,162 and 40 per cent of $19,250.

American Liberty Oil Co., Mt. Pleasant, Tex., gasoline, 65 per cent of $2,125,000 and 45 per cent of $315,000; Skelly Oil Co., Longview, Tex., gasoline, 65 per cent of $1,044,000 and 45 per cent of $56,000; Mid-Continent Petroleum Corp., Tulsa County, Oklahoma, gasoline, 65 per cent of $187,000; Universal Oil Products Co., Mooringsport, La., components for benzene and toluene, 75 per cent of $594,000, 50 per cent of $119,000, and 15 per cent of $337,000.

Shamrock Oil & Gas Corp., Sunray, Tex., dry gas, gasoline, gas oil, and coke, 65 per cent of $640,427 and 50 per cent of $19,550; Ralph E. Fair, Inc., Duval County, Texas, liquid fuels, 65 per cent of $298,000; Sid Richardson Gasoline Co., Winkler City, Tex., sulfur, 70 per cent of $177,350; Bay Petroleum Corp., Denver, butanes and butylenes, 65 per cent of $1,546,800 and 45 per cent of $167,700; Shell Oil Co., Wilmington, Calif., benzene, 90 per cent of $100,000; Elk Refining Co., Falling Rock, W. Va., motor gasoline, 65 per cent of $750,000.

Lakeside Refining Co., Kalamazoo, Mich., gasoline, 65 per cent of $277,500, 40 per cent of $128,500, and 15 per cent of $25,000; Stanolind Oil & Gas Co., Pettus, Tex., isobutane, 90 per cent of $161,400; Shell Oil Co., Harris County, Texas, ethyl chloride, 50 per cent of $2,645,000 and 15 per cent of $75,000; Phillips Petroleum Co., Carson and Gray counties, Texas, natural gasoline, 40 per cent of $306,000, and in Texas County, Oklahoma, 40 per cent of $249,153, and Upton County, Texas, 65 per cent of $9,330,800 and 40 per cent of $2,366,945.

General Petroleum Corp., Los Angeles, aviation gasoline, 90 per cent of $732,000, 65 per cent of $7,979,300, and 45 per cent of $1,810,700; Phillips Petroleum Co., Borger, Tex., gasoline, 45 per cent of $78,670.

Pipe lines . . . Cincinnati Gas & Electric Co., Cincinnati, natural gas, 25 per cent of $97,860; Wisconsin Natural Gas Co., Milwaukee, 25 per cent of $400,600; Hugoton Production Co., distribution of natural gasoline in Grant and Stevens counties, Kansas, 40 per cent of $422,000; Trunkline Gas Co., Houston, 25 per cent of $150,000 and 15 per cent of $362,000.

Storage . . . all at 40 per cent of amount approved: Socony-Vacuum Oil Co., Inc., South Norfolk, Va., $177,000; Pure Oil Co., Andrews City, Tex., propane, $213,000; Pure Oil Co., Port St. Joe, Fla., products, $181,690; Standard Oil Co. of California, Seward, Alaska, gasolines and fuel oil, $372,400.

Tidelands Return

Bill to head for expected presidential veto this week

WASHINGTON.—Legislation restoring the states' titles to their offshore oil and other resources will start on its way toward an expected veto by President Truman this week.

Differences between measures passed by the Senate and House were settled by a conference committee last week by the simple expedient of agreeing to accept the version passed by the Senate.

The compromise bill establishes the title of the states in their offshore submerged lands out to their former seaward boundaries—3 miles in the case of other states, 10½ miles for Texas—with federal rights limited to first call on oil produced in the tidelands area in times of emergency.

The bill leaves to the federal Government all rights in the submerged lands between the state boundaries and the edge of the Continental Shelf. It does not contain a provision carried in the measure passed by the House giving the states 37½ per cent of the revenue from oil and gas operations beyond their boundaries.

In the event the President vetoes the bill, as generally expected, the big question will be whether the Senate will be able to override that veto. Proponents of state ownership are confident they can get the necessary two-thirds vote in the House, which passed the measure by a big majority, but there is some doubt of their ability to get the necessary vote in the Senate, where the bill was approved last month by a vote of 50 to 35.

Materials Orders Set

WASHINGTON.—The following orders have been issued by the Petroleum Administration for Defense and the National Production Authority.

PAD

Order No. 5, May 1: Imposing emergency controls on deliveries, inventories, and exports of motor gasoline, kerosine, distillates, and residual oil.

Order No. 6, May 6: Imposing limitations upon the delivery of aviation gasoline to commercial aircraft and prohibiting export except with PAD approval.

NPA

Revocation of M-75, April 29: Eliminating restrictions on the sale, delivery, use, and inventories of steel shipping drums.

Amendment to Dir. 1, CMP Reg. 1, April 30: Permitting small concerns to share directly in the improved materials-supply situation.

Revocation of Schedule 7 to M-45, April 30: Eliminating allocation controls on sebacic acid, used, among other purposes, in seam sealing and caulking compounds for aircraft gasoline tanks.

Dir. 4 to NPA Reg. 2 amended, April 30: Permitting delivery of additional types of electronic components on rated orders to laboratories and research organizations for experimental and development purposes.

Product Exports at Peak

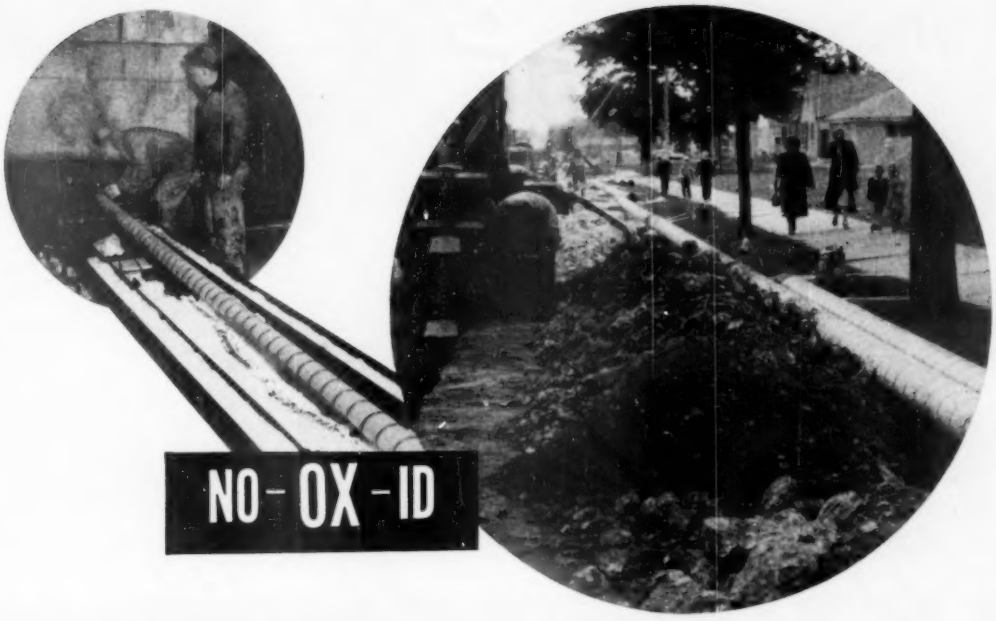
WASHINGTON. — Major product exports averaged 239,700 bbl. daily for week ended April 11 to reach the highest level since the week ended December 14. Exports for week ended April 11 represented an increase of 71,700 bbl. daily over the preceding week.

The weekly report of the Petroleum Administration for Defense showed that while aviation gasoline exports ran 10,400 bbl. daily under the week ended April 4, shipments of all other products showed substantial increases.

Details of the export movement as compared with the preceding week and the average movement for the 4 weeks ended April 11 are shown in the following table, in thousands of barrels daily:

	—Week ended—		Average
	Apr. 11	Apr. 4	4 weeks
Aviation gasoline	27.1	37.5	32.0
Motor gasoline	29.6	25.7	17.0
Kerosine	17.1	0.1	17.9
Distillate	88.9	46.2	63.7
Residual	77.0	58.5	58.8
Total	239.7	168.0	189.4

Most important increase for the week was the gain of 42,700 bbl. daily in shipments of distillate fuels to 88,900 bbl. daily. This rate has been exceeded only once this year, for the week ended January 4. Residual shipments were the highest since February 8. Motor gasoline exports for the week were 12,600 bbl. daily greater than the 4-week average.



is the preferred protective coating for gas mains and services

With more and more homes converting to gas heat . . . with natural gas expansion programs underway . . . the matter of protective coating for gas distribution systems is more important than ever.

Probably that is why so many progressive utilities have learned the economy of protecting these pipe lines with NO-OX-ID coatings and NO-OX-IDized wrappers. The reason *is simple* . . . and economical. Once distribution piping is laid, it's vital that protection against corrosion be positive, complete. NO-OX-ID combinations afford that kind of superior protection.

Why not, then, on your next extension or replacement of your distribution system investigate NO-OX-ID? A Dearborn Sales Engineer will gladly demonstrate and substantiate why NO-OX-ID is the preferred protective coating for gas distribution lines. No obligation, of course.

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza • Chicago 54, Illinois

WRITE FOR THIS COMPLETE CATALOG ON PIPE LINE PROTECTION

"Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers," completely describing the modern and economical Dearborn method of pipe line protection, will be sent on request. Mail the coupon.

Dearborn Chemical Company, Dept. OG
Merchandise Mart Plaza, Chicago 54, Ill.

☐ Send me a copy of "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers."
☐ Have a Dearborn Sales Engineer call.

Name.....
Company.....
Position.....
Address.....
City.....*Zone*...*State*.....

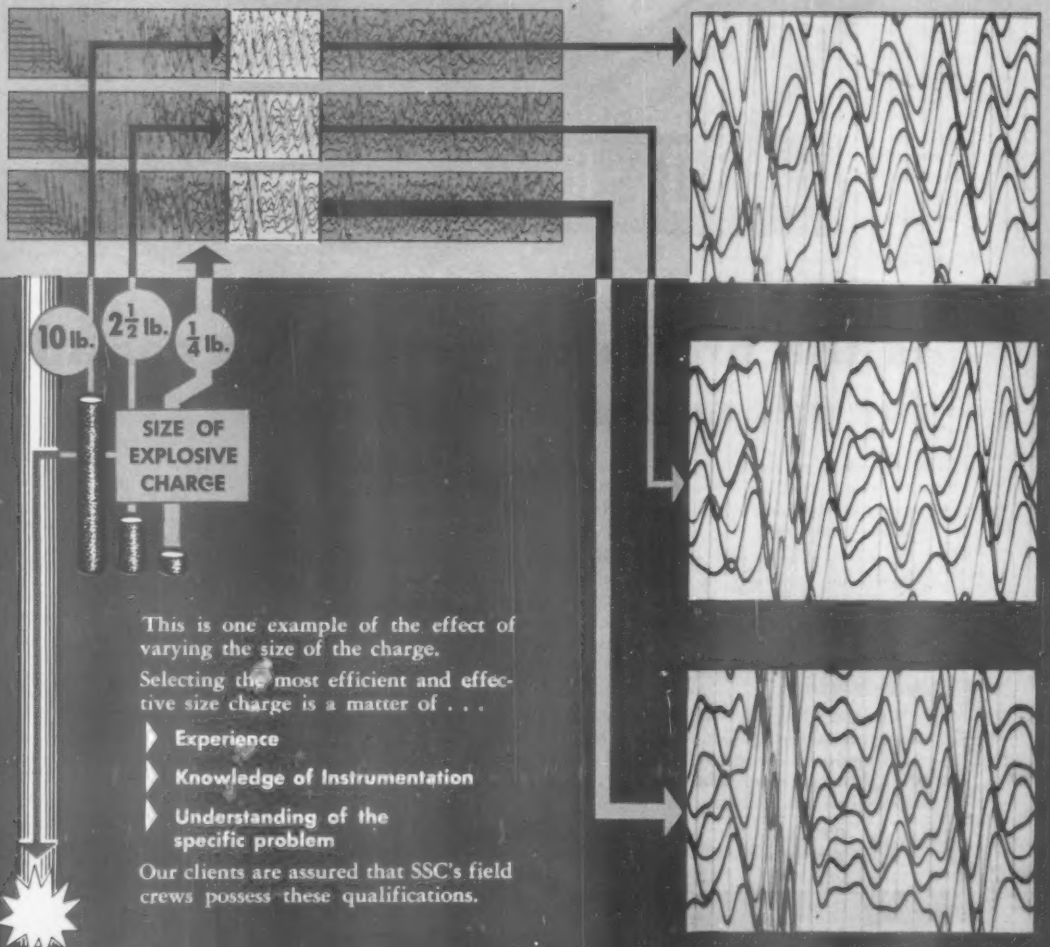
Dearborn
Reg. U.S. Pat. Off.

NO-OX-ID
IRON + = RUST

THE ORIGINAL RUST PREVENTIVE

Basic Methods of Improving Seismic Records...

The Effect ...of SIZE of CHARGE



This is one example of the effect of varying the size of the charge.

Selecting the most efficient and effective size charge is a matter of . . .

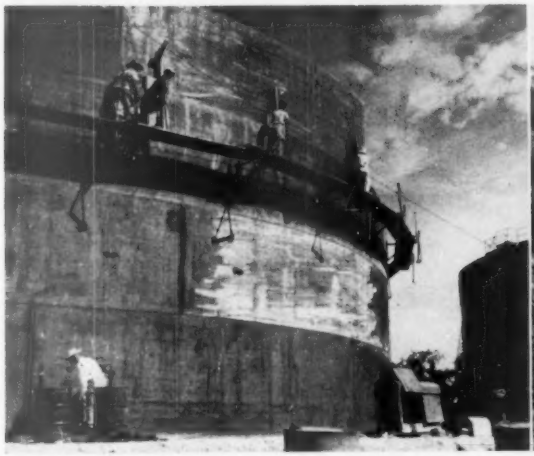
- Experience
- Knowledge of Instrumentation
- Understanding of the specific problem

Our clients are assured that SSC's field crews possess these qualifications.

Seismograph Service Corporation

Seismic Surveys – Gravity Surveys – Pilot Crews – Lorac

TULSA 1, OKLAHOMA, U.S.A.



NATIVE WORKERS erecting a 55,000-bbl. tank for Caltex at the central pump station in Sumatra's Minas field.

DENSE JUNGLE is shown in this view of a bulldozer hauling a 50-ton diesel engine from Siak River to Minas field.

FAR EAST

Sumatra Crude Moving

First shipment of Minas field oil to leave Far East this week; reports put total reserves at half-billion barrels

MINAS field in Central Sumatra, regarded as a major oil reservoir of the Far East, is scheduled to make its first commercial shipment this week.

The operating company is N. V. Caltex Pacific Petroleum Mij., a Dutch company affiliated with the Caltex Group (Standard Oil Co. of California and The Texas Co.). The company now has 33 wells in the field and has completed a 12-in. pipe line about 17 miles in length to a river terminal at Perawang, on the Siak River.

The company has built three river tankers, shallow-draft vessels of about 3,400 tons capacity, which will move the crude from Perawang to an ocean terminal at Sungai Pakning, located about 90 miles distant on the Strait of Bengkalis. First shipment from Pakning was due to be made about May 12 when the tanker Gage Lund will lift a cargo of about 200,000 bbl.

Minas field is interesting from several standpoints. Though there has been no official disclosure of the reserves by Caltex, reports from San Francisco about a year ago indicated they are of the order of a half billion barrels.

The actual discovery well of Minas field was drilled during the war by the Japanese. The structure had been located and equipment moved in by March 1942 when the last Dutch resistance in Sumatra collapsed. When company personnel were finally able to return to the area in 1946, they found Minas 1 was a producer and were able to recover the systematic production records which the Japanese had kept.

Minas crude is considered to be of good quality, though wax content is about 20 per cent. Gravity of the crude ranges around 35° A.P.I. Production comes from the lower Miocene at about 2,250 ft. The structure is that of a low-dip cone.

Marketing plans . . . Caltex's announcement on the opening of Minas field said only that the oil "will be available for sale and distribution to such markets as experience may prove to be economically feasible." Standard of California announced last November that shipments will be made to the West Coast, initially about 8,000 bbl. daily and increasing to 10,000 bbl. daily by July.

Caltex has extensive and growing refining interests in Eastern Asia. Caltex (Philippines), Inc., is preparing to build a plant of 16,000 bbl. daily capacity at Batangas, near Manila, and company representatives in Manila indicated it would use Sumatran crude.

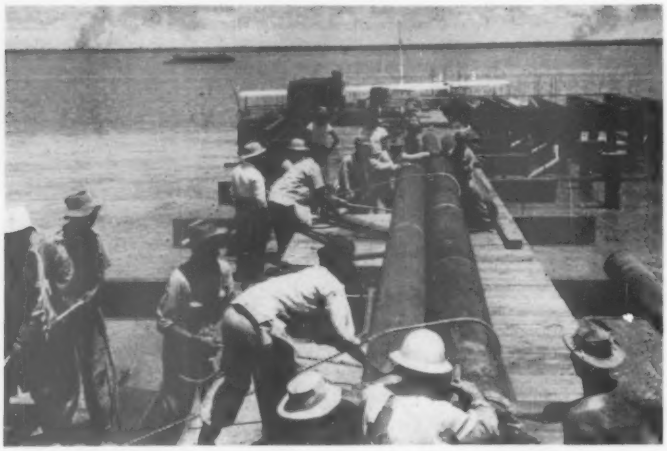
Caltex Oil, Australia, Pty., Ltd., is planning a refinery of about 20,000 bbl. daily capacity in the Sydney area. The Caltex organization now has a minority interest in Bitumen & Oil Refineries, Ltd., which has about 6,000 bbl. daily refining capacity.

In Japan, Caltex has half interest in Nippon Petroleum Refining and Koa Oil Co., Ltd., and has invested more than $24,000,000 in that country. Nippon and Koa together have three refineries with an aggregate capacity of nearly 30,000 bbl. daily.

The use of shallow-draft river tankers to move Minas crude to tidewater is similar to the method followed in Lake Maracaibo in Venezuela but which is being supplanted to an increasing degree by the construction of large-diameter lines direct to ocean terminals. One river tanker already delivered for the Minas operation, the Caltex Pakanbaru, is being used to deliver the initial production of about 15,000 bbl. daily.

Late in April, at Kinderdijk near Rotterdam, the Caltex Rupat, a twin-screw motor tanker, was launched at the yard of L. Smit & Sons Shipping & Tool Construction Co. The third vessel also under construction in the Netherlands is the Caltex Bengkalis. The Caltex Rupat has a capacity of 3,780 cu. m. (about 24,000 bbl.) and a loading capacity of 3,030 tons. Service speed is 10.5 knots.

Background . . . The original Standard of California company was Nether-



UNLOADING PIPE at the Pakning ocean terminal of Caltex Pacific Petroleum.

landsche Pacific Petroleum Maatschappij.

The name was changed last year to the Caltex Pacific Petroleum Mattschappij. N. P. P. M. was formed by Standard of California in 1930. In 1936 it was granted prospecting rights in central Sumatra and in the same year a half interest in the operation was acquired by The Texas Co.

From 1936 until it was forced out by the war, the company carried on exploratory work and in 1941 made an encouraging discovery on the Doeri anticline about 40 miles from Minas. Four producing wells were completed prewar. Another prewar discovery was at Sebanga, about midway between Minas and Doeri, where three producers were completed prior to the Japanese invasion.

There is one other producing field in central Sumatra, Lirik, a Standard-Vacuum Oil Co. operation. The field now produces about 50 bbl. daily for local use. Potential is greater but the area thus far lacks a pipe-line outlet. The Shell fields and refinery in North Sumatra are still inaccessible to the company and are being produced on a limited basis by Indonesians. The main Indonesian production is from the Shell and Standard-Vacuum fields in South Sumatra.

The Minas field is the first production developed by the Caltex Group outside the Middle East. This important Eastern Hemisphere marketing organization holds the Bahrein operation plus oil available from Arabian American Oil Co. in which its two parents each own 60 per cent. Increasing activity is planned in exploration through American Overseas Petroleum, Ltd., which was recently organized by the two parent companies and which now is working with an Australian company in Western Australia.

MIDDLE EAST

Stiff New Demands

Arabia seeks share before taxes, reduced concession

THE stiff demands being made by the Saudi Arabian Government in the current concession-revision negotiations with Arabian American Oil Co. were reported last week from Beirut, Lebanon.

The government was reported to be asking changes in the 50-50 agreement with the company under which it would receive its share before deduction for United States income taxes. Another demand was that half of the company's board of directors be Saudi Arabians.

In New York, Aramco issued the following statement:

"Discussions have been carried on from time to time largely in connection with problems relating to implementing the 50-50 agreement reached in 1950. This agreement itself is not at issue, nor is the present royalty rate. Aramco is not at liberty to reveal the exact status of the current discussions."

$50,000,000 jump . . . Reports received in New York from what was described as a company source in Beirut said that it had been estimated that a revision to a 50-50 deal before United States taxes would raise the government's annual oil revenue from $150,000,000 to $200,000,000 annually.

Besides the demand for half the board representation, the government was insisting on shifting the company headquarters from New York to Saudi Arabia. Aramco has already announced plans to move its top management to Saudi Arabia.

Concession reduction . . . Another demand as reported from Beirut concerned the company's concession holdings. Aramco holds rights over some 400,000 sq. miles. The government was said to be insisiting that the company surrender half of this and relinquish out of the other half what could not be developed over the next 5 years.

Furthermore, the government is asking that Aramco guarantee it against loss in case of war by agreeing to a payment of $100,000,000 in this event.

Negotiations between the government and the company are understood to have begun in mid-April. In late 1950, the company signed the first 50-50 agreement in the Middle East with the Saudi Arabian Government.

Last year, another Middle East company, Iraq Petroleum Co., Ltd., reached a 50-50 agreement with the Iraqi Government which is considered to contain somewhat more favorable terms for the government. I.P.C.'s agreement includes increased minority board representation, payment before taxes, and guarantees in case production is halted.

Iranians Sell First Oil

The national Iranian Oil Co. has made its first sale of oil from the nationalized properties of Anglo-Iranian Oil Co., Ltd.

The quantity, however, was negligible. An Italian merchant ship docked at Khorramshahr, across the river from Abadan, and then found it needed bunkers. It moved over to Abadan and took on about 40 tons (300 bbl.) of fuel oil, paying cash.

It was the first oil of any kind to move out of Iran since late last June when Iranian insistence on tanker receipts caused suspension of the entire export trade. Iran has some 12,000,000 bbl. of products piled up in storage at Abadan, and operations in the country, once the world's second largest oil exporter, have been scaled down to the trickle necessary to meet domestic consumption.

There is no sign of a break in the deadlock between the British and Iranian positions. Iran has sought widely and unsuccessfully to sell some of the production. Without the assistance of the large international companies, it could at best move only a small amount, and even this possibility has

been blocked by existing high spot-market tanker rates.

Rumors have circulated recently that the Russians are taking increasing interest in the Iranian situation, but so far they lack support in any concrete developments.

Negotiations Open

Tapline, I.P.C. working on new right-of-way pacts

NEGOTIATIONS have been opened in Damascus, Syria, and Beruit, Lebanon, on revision of the pipe-line right-of-way agreements held in these countries by Trans-Arabian Pipe Line Co. and Iraq Petroleum Co., Ltd.

In Beruit, the main points being discussed between the Lebanese Government and the two companies concern increased payments and limitation of some of the rights granted in the earlier agreements. The discussions taking place in Damascus are along similar lines.

In the case of Tapline, one important further question is on the 200,000 tons of crude annually which the company agreed to furnish Syria for local refining. A monetary payment in lieu of this oil is being discussed.

Refinery involved . . . In Lebanon, I.P.C. operates a 10,000-bbl. daily refinery which meets most of the needs of the Syrian-Lebanese market. The I.P.C. negotiations with Lebanon also are concerned with the output of this plant.

Neither Syria nor Lebanon has any indigenous oil production but both countries are crossed by the pipe lines which lead from Middle East fields to the Eastern Mediterranean. The governments receive transit fees plus certain other sums for guarding the lines.

There has been same talk recently on construction of a refinery in Syria, possibly a government project with assistance from the International Bank. Jordan, another country crossed by Tapline, also aspires for a refinery. Such refinery plans usually are based on the somewhat unlikely prospect of developing export markets.

Training Course Opened

Anglo-Iranian Oil Co., Ltd., has opened a training course for process operators for its Isle of Grain refinery which will go into initial operation this summer.

Twenty trainees are now taking instruction, and another group of 20 will start in September. The instructor is V. R. Greenstock, who conducted similar courses for Iranian trainees at Abadan in Iran.

C. E. SPEARING

M. A. L. BANKS

H. E. RIGDEN

S. W. ADEY

Anglo-Iranian Reorganized

Anglo-Iranian Oil Co., Ltd., now in the midst of an extensive program to build up processing facilities to replace the 500,000 bbl. daily of capacity lost at Abadan, Iran, has announced a complete reorganization of its refining department.

D. W. K. BARKER

This phase of the company's operations has been split into six divisions. Heading the department as general manager in the London headquarters is C. E. Spearing. Deputy general manager is M. A. L. Banks.

The research and development work will be directed by D. G. Smith. This includes the program at the research station at Sunbury in England as well as patents, licensing, process development, and related activities. R. C. Thompson is manager of the engineering division and is responsible for the execution of the various projects.

The other four divisions are regional organizations. These divisions and managers are: United Kingdom, H. E. Rigden; Middle East, S. W. Adey; Australian, D. W. K. Barker; and Continental Europe, now being coordinated by D. A. Bell, manufacturing, and C. Billingsley, projects, under the general direction of Banks, pending the appointment of a manager.

LATIN AMERICA

Bogota Line Finished

87-mile products carrier to begin operations soon

THE new 87-mile products pipe line supplying Colombia's capital city, Bogota, is due to go into operation this month.

The Bogota project is an important part of the system of products lines which is being built to serve several of the country's larger consuming centers. It originates at Porto Salgar on the Magdalena River which now receives products by barge from the Barrancabermeja refinery.

Williams Brothers built the Bogota line and has contracted to operate it on behalf of the Department of Cundinamarca. William Brothers' operating contract runs for 4 years, during which it will train Colombians for the work.

The 6⅝-in. line required a total of about 4,000 tons of steel and was planned to have a capacity of 8,850 bbl. daily with three pump stations. It extends across mountainous country, rising from 570 ft. at Salgar to 8,600 ft. at Bogota and reaching maximum elevation of about 9,000 ft. some 50 miles from the Bogota end.

Bogota has had frequent interruptions in its supply of petroleum products, which have been moved over a 220-km. railroad line. Landslides along the railroad's route have caused shortages and gasoline rationing in the past in the capital. Besides promising assured supply, the pipe line will transport products at a marked savings. The rail and truck transportation charges amount to about $1.85 a barrel. On the basis of a 4,000-bbl. daily throughput, the pipe line will be able to move a barrel of oil for about 58 cents.

The Colombian Government granted a concession to the Department of Cundinamarca to build the line. A part of the $4,000,000 cost was financed by International Petroleum Co. (Colombia), Ltd., through a loan.

Other lines . . . One other products line is under construction in Colombia and three others are under consideration. Carolina Constructors are the contractors for the line being built from Porto Berrio on the Magdalena River to Medellin.

The Department of Caldas is planning the construction of a La Dorada-Manizales-Cartago line. Transportation difficulties recently have caused scarcity of products and high prices at Manizales.

Another line under consideration is

from the Pacific Port of Buenaventura to Cali.

The government organization, Empresa Colombiana de Petroleos, is making definite plans to build a 93-mile line from Cantimplora to Salgar which will provide pipe-line transportation all tne way from Barrancabermeja to Salgar by use of an existing line.

Move in Bolivia

Group of Texans reported seeking concession rights

A GROUP of unidentified independent operators was reported last week to be seeking concession rights in Bolivia.

The group was said to be preparing to invest $40,000,000 in exploratory work and in the possible construction of an export pipe line from lower Bolivia to Asuncion, Paraguay. The reports originated in La Paz and were not confirmed elsewhere.

Don Carroll, consulting geologist, was named as the representative of the group and was quoted in La Paz as saying that negotiations which were begun with the overthrown military junta would be continued soon with the new National Revolutionary Movement Government.

Carroll said the group had a choice of 210,000 acres of new territory that should contain five or more fields and had an option on one field capable of having 280 wells with an average initial output of 2,000 bbl. daily. The report spoke of an 80,000 to 100,000-bbl. daily pipe line to Asuncion which would cost $26,000,000 to $29,000,000.

The Bolivian Government oil agency, Y.P.F.B., has had considerable difficulty with production in recent years. The present output of around 2,000 bbl. daily is insufficient to operate the 9,000 bbl. daily of refining capacity which the Export-Import Bank, of the U. S. Government financed in the country. The refineries have been operating only about 10 days a month.

When the Bolivians sought an additional $3,000,000 last year to develop production, Carroll, who has been an oil official with various Washington agencies, was sent to Bolivia for an on-the-ground report on loan from the National Production Authority. In late 1950, the Bolivian Government changed its laws to allow private foreign capital to operate in certain areas. The report Carroll made last year after his trip said that Bolivia possesses oil reserves comparable in area and in volume to the Rocky Mountain region of the United States, and strongly urged their development.

EUROPE

Search Pays Off

Dutch well near Berkel may be commercial oiler

THE exploration work which has been carried out in the Netherlands since the end of the war by Nederlandse Aardolie Maatschappij has paid off in indications of possible commercial oil near Berkel in South Holland Province.

The well was drilled to just short of 3,000 m. (about 9,150 ft.). After tests showing oil at an unreported rate, the company prepared to move in tanks for further testing. Some difficulty was being experienced with pipe in the well. Additional drilling in the area is planned.

The operating company is a joint affiliate of the Royal Dutch-Shell Group and Standard Oil Co. (N. J.) with Shell as the operator. In the four years from 1948 through 1951, N.A.M. has spent the equivalent of approximately $12,000,000 in exploratory work in the country.

Gas reserves . . . Other than the possible discovery near Berkel, the Netherlands exploration has found some natural-gas reserves, and commercial production at a restricted rate is to begin soon. The gas has been discovered at six places, all in the eastern part of the country. They are Coevorden, de Wyk, Staphorst, Wanneperveen, Tubbergen, and Denekamp.

Production plans concern Wanneperven and Tubbergen, which, pending further drilling, are considered good for 45 million cubic meters (about 1,575 million cubic feet) annually—35 million cubic meters from Wanneperveen and 10 million cubic meters from Tubbergen. Under concession terms, the gas will be sold to the state which in turn will sell it to local gas companies, mostly owned by municipalities.

The Netherlands' single existing oil area is Schoonebeek near the German border which was discovered in 1943 and has a production of about 13,500 bbl. daily. N.A.M. has the 93,000-hectare concession, which includes this area, and recently applied for a second concession of 17,000 hectares around Tubbergen.

Austrian Market Dwindles

The large volume of heating oils released on the Austrian market by the Russians is hitting Polish coal exports —that country's top export commodity.

Austrian state-owned railways, sugar refineries, cement works, and other industries—now that oil is available in sufficient quantity — have converted their equipment because oil is cheaper.

Last year, it was estimated that between 300,000 and 500,000 tons of coal was saved. This saving is cutting deep into one of Polish coal's top markets.

The heating oil released by the Soviet Mineral Oil Administration is from the crude production which the Russians have been able to increase in their zone, which contains all of Austria's oil fields.

Crude Line Completed

A 7-mile, 6-in. pipe line has been completed to move crude from the port of Duisburg - Ruhrort to the newly opened refinery of Ruhrchemie, A.G., at Oberhausen - Holton in West Germany.

The line was built jointly by the company and the port authority. It has a capacity of 100 cu. m. (about 15,120 bbl.) daily and will be placed in operation as soon as storage tanks are finished at Duisburg. The new refinery has a capacity of 250,000 tons (about 5,000 bbl. daily).

New Seismic Work Scheduled

Preparations to undertake seismograph work in an area east of Nottingham in England are now being made by Anglo-Iranian Oil Co., Ltd.

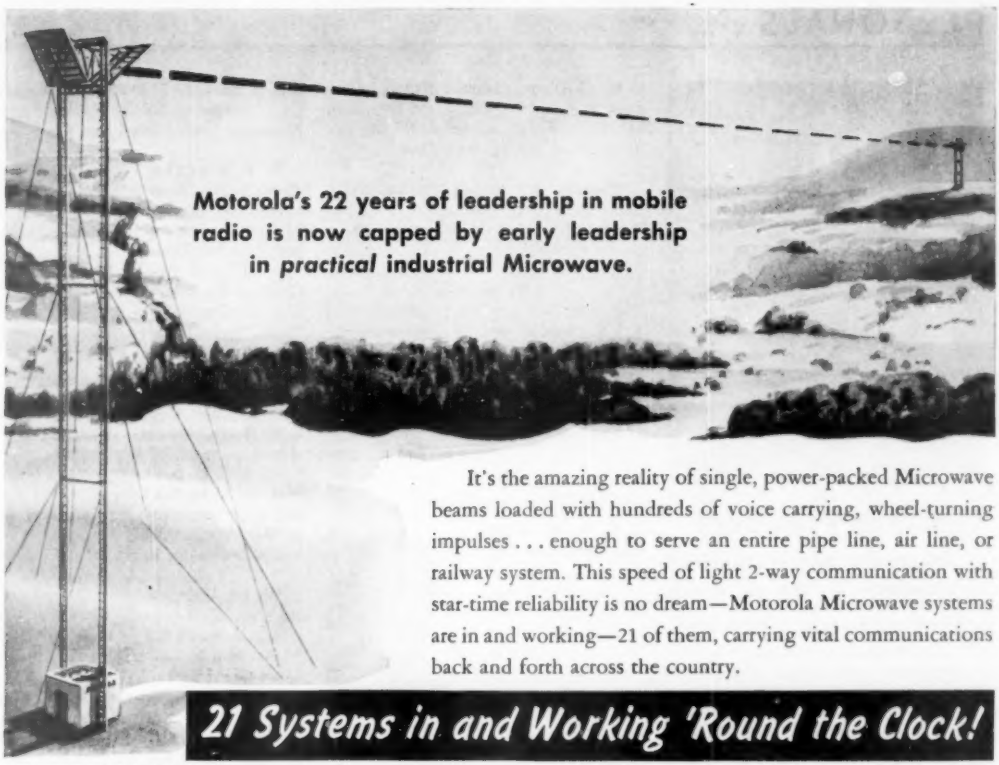
Some work in this general area has been done in the past by the Standard Oil Co. (N. J.) organization.

At Formby, deep drilling by Anglo-Iranian continues. Three additional shallow holes drilled between existing wells have added appreciably to the field's production and show scope for further small-scale development. D'Arcy Exploration Co., Ltd. (Anglo-Iranian), also is preparing to drill on a location in the middle of the Isle of Wight off the southern coast of England.

International Briefs

Part of the Shell terminal at Bien Hoa, 15 miles north of Saigon in Indochina, has been destroyed by Vietminh rebels who blew up two storage tanks with remote-control mines. Nearly 3,000 bbl. of gasoline was lost.

The Kockums yards in Sweden have launched the 16,000-ton motor tanker Brasil for The Texas Co. (Norway) AS., Oslo. The vessel has a total tank volume of 770,000 cu. ft. divided into 28 different tanks.



Motorola's 22 years of leadership in mobile radio is now capped by early leadership in *practical* industrial Microwave.

It's the amazing reality of single, power-packed Microwave beams loaded with hundreds of voice carrying, wheel-turning impulses . . . enough to serve an entire pipe line, air line, or railway system. This speed of light 2-way communication with star-time reliability is no dream—Motorola Microwave systems are in and working—21 of them, carrying vital communications back and forth across the country.

21 Systems in and Working 'Round the Clock!

Maximum Channel Availability

PARTIAL LIST

Mid Valley Pipeline Company (1000 miles)
Texas Illinois Natural Gas Pipeline Co. (1000 miles)
Aeronautical Radio, Inc (air-ground radio control)
Hawaiian Air Lines (air-ground control)
Shell Pipeline Co. (2nd year)
Panhandle Eastern Pipeline Company (telemetering)
Pan American Pipeline Co. (with private wire-line tie-in)
Michigan State Police (with remote V.H.F. control)
State of California
City of Dayton

Multiplexing messages, via telemeter, teleprinter, automatic supervisory control and voice channels tying-in with push button convenience into vast Motorola 2-way mobile radio networks.

Remember! EXPERIENCE COUNTS especially in Microwave!

Here again Motorola's broad scientific knowledge and *practical* experience is providing your industry, safety or defense organizations with the best answer to practical communication requirements.

24 Channels — Five

Motorola Microwave

Communications and Electronics Division • 4545 Augusta Blvd., Chicago 51, Illinois

In Canada: **Rogers Majestic Electronics, Ltd., Toronto, Canada**

WRITE: MOTOROLA MICROWAVE—4545 AUGUSTA BLVD., CHICAGO 51, ILL.

Creslenn President

Alexander began career as teamster in the oil fields

CLYDE HAMILTON ALEXANDER, 71, can look back with pride over a story-book career which began when he quit his schooling at 14 to drive a team of horses in the oil fields.

Today he is president and director of Creslenn Oil Co., vice president and director of the Independent Petroleum Association of America, and a director of the Independent Natural Gas Association of America and Transcontinental Gas Pipe Line Co.

He was born in Mercer County, Pennsylvania, where his father owned a sawmill, and later worked in Pennsylvania oil fields. In 1904 he moved to Bartlesville, in Indian Territory, and became a roustabout for Douglas & Lacy Co. Later he was appointed Osage superintendent for Creston Oil Co., and connections followed with Gulf Oil Co. and Wolverine Oil Co. He served as superintendent of production for Phillips Petroleum Co. from 1917 to 1928. In 1923 he began an 11-year span as vice president and general manager of Phillips.

A victim of the 1929 financial crash, Alexander salvaged enough to purchase oil properties in Arkansas. He persuaded associates to join him in promoting a plan to produce wet gas, strip it, and force dry gas back into the original formation. The first cycling plant near Corpus Christi proved successful.

In recent years he has been associated with other major cycling, natural-gasoline, and natural-gas projects of the Southwest. He resides at Trinidad, Tex.

W. G. Olson, formerly regional geologist at Casper, Wyo., for Continental Oil Co., has joined Houston Oil Co. as division geologist at Casper.

Clarence E. Moody, geologist for Ohio Oil Co. at Shreveport, La., has been installed as the first chairman of the new southeastern section of the Geological Society of America. Other officers are **J. L. Stuckey,** North Carolina state geologist, vice chairman, and **C. W. Wilson, Jr.,** geology professor at Vanderbilt University, Nashville, Tenn., secretary.

Donald H. Lewis, Houston, has been named vice president of Shell Pipe Line Corp. He joined Shell Pipe Line in 1927 and became chief engineer in 1939 and a director in 1942.

H. A. W. KIDD

H. A. W. Kidd has been appointed an assistant to the director of Socony-Vacuum Laboratories at New York, effective June 1. For the past 8 years he has been assistant to the director of field research laboratories in Dallas of Magnolia Petroleum Co., an affiliate of Socony-Vacuum Oil Co., Inc. He will be succeeded at Magnolia's field research laboratories by **Eugene Stanton Wilhelm,** who has been employed there nearly 5 years as a physicist.

Rae Preece, Mid-Continent division manager for Hancock Oil Co., has opened a district office for the firm in Dallas. Prior to joining Hancock, Preece was chief geologist for Devonian Oil Co.

F. L. Dunn, district superintendent for Continental Oil Co., has been transferred from Lyons to Great Bend, Kans.

Ralph T. McElvenny, financial vice president and assistant to the chairman of American Natural Gas Co. since 1945, has been elected executive vice president of the company. He is a director of American Natural and its subsidiaries, Michigan - Wisconsin Pipe Line Co., Milwaukee Gas Light Co., Milwaukee Solvay Coke Co., and Michigan Consolidated Gas Co.

B. F. CURTIS

B. F. Curtis, Denver, has been appointed Rocky Mountain regional geologist for Continental Oil Co. Curtis, who joined Continental in 1946, holds degrees from Oberlin College and the Universities of Colorado and California. He succeeds **J. S. Royds,** who was promoted to regional manager of exploration.

R. N. Ayars has been promoted from petroleum engineer for Ohio Oil Co. at Bakersfield, Calif., to assistant division petroleum engineer at Houston.

W. H. Arrington, formerly with the Railroad Commission of Texas, has joined Ashland Oil & Refining Co. at Midland, Tex., as an engineer.

D. K. Hanan, formerly in electronic research for the U. S. Navy at San Diego, Calif., has been appointed exploration supervisor for Hanan & Morrow at Roswell, N. M.

W. F. Stroud, formerly manager of the Philadelphia refinery of Atlantic Refining Co., has been elected a vice president of the company and appointed general manager of manufacturing. He will be responsible for the company's purchases of crude oil. He succeeds **E. J. Henry,** who is withdrawing from active service with the company after 47 years' service and is continuing as a director. **D. T. Shaw,** formerly assistant manager of the Philadelphia refinery, succeeds Stroud as manager. Stroud served as assistant manager at Philadelphia before becoming manager in 1945.

Henderson Supplee, Jr., executive vice president of Atlantic Refining Co., has been elected president of the firm. He succeeds **Robert H. Colley,** a veteran of 33 years with the company, who was named chairman of the board of directors.

W. O. Allen, formerly district manager for United Gas Pipe Line Co. at Wichita Falls, Tex., has been transferred to Shreveport as a construction superintendent.

PERSONALS

Chick Johnson has been transferred from Benton, Ill., to Evansville, Ind., as general superintendent for Westfall Drilling Co.

H. E. Zoller, Jr., geologist formerly with Peel-Hardman at Hill City, Kans., is now with Skiles Oil Corp. at Hutchinson, Kans.

W. Alton Jones, president of Cities Service Co., this week will be presented the Americanism award of the James H. Teel Post 105 of the American Legion, Bartlesville, Okla. The award will be presented May 12 by **Donald R. Wilson,** national commander of the Legion at a dinner in Bartlesville.

C. B. (Ike) Truitt, formerly with Grove Regulator Co., Oakland, Calif., has joined Hiwan Petroleum Co., Houston, as vice president and manager of sales. A 1931 mechanical-engineering graduate of the University of Oklahoma, Truitt since has been associated with Hanlon-Waters, Inc., A. O. Smith Corp., and Grove Regulator, and has operated independently as an L.P.G. distributor.

Arthur J. Monzingo, formerly a petroleum engineer for Magnolia Petroleum Co. in Midland, Tex., has been promoted to district petroleum engineer at Wewoka, Okla.

E. G. D. Northcroft, formerly chief representative of Anglo-Iranian Oil Co., Ltd., in Teheran, has retired after 32 years of service with the company. Other recent retirements in the Anglo-Iranian organization include: **R. C. H. Cox,** general manager of British Petrochemicals at Grangemouth; **D. K. Anderson,** formerly superintendent of process control at Abadan, Iran; **D. Bex,** field superintendent in the northern areas in Iran; **L. J. Carr,** assistant drilling superintendent at M.I.S. in Iran; **W. R. Carrington,** drilling superintendent in Papua until 1950; and **A. D. Laurie,** formerly chief operator in the cracking department at Abadan.

R. J. S. Pigott, director of the engineering division of Gulf Research & Development Co., has been named winner of the Egleston Medal for 1952. The award is made annually by Columbia University's Engineering Alumni Association. Pigott is a mechanical-engineering graduate of Columbia.

New Officers of Gasoline Supply Men

Pictured at Houston following the election of officers of the Natural Gasoline Supply Men's Association are, left to right, front row: Dallas S. Deem, American Air Filter Co., Tulsa, retiring president; M. E. Duncan, Johns Manville Corp., Tulsa, new president; and M. A. Ellsworth, Fluor Corp., Ltd., Tulsa, first vice president. In the back row are H. M. Anderson, Brown & Root, Inc., Houston, treasurer; C. C. Clover, Westcott & Greis, Inc., Tulsa, second vice president; and W. F. Lowe, Tulsa, secretary.

Courtney C. Brown has been elected to the board of directors of Esso Standard Oil Co. In addition to taking part in Esso Standard's affairs, he will continue to serve Esso's parent company, Standard Oil Co. (N. J.), as assistant to the chairman and economic advisor.

Ray Althouse, Bartlesville, Okla., formerly executive for Cities Service Oil Co. and subsidiaries, has been appointed executive vice president of Royalite Oil Co., Ltd., independent Canadian company.

R. R. (Rod) McDaniels has been appointed acting head of the reservoir-engineering section of the western producing division of Imperial Oil, Ltd. Before joining Imperial he was employed by Creole Petroleum Corp. in drilling and production work in Venezuela.

Archie L. McGehee has been promoted from a roustabout for Sinclair Oil Corp. at Seminole, Okla., to an engineer at St. Louis, Okla.

Lester Ringenberg has been appointed Michigan district geologist for Smith Petroleum Co., at Grand Rapids, Mich. He replaces **Ray Harrison,** who resigned to join Lion Oil Co. at Bismarck, N. D.

A. J. (Jack) McCaskill, formerly district petroleum engineer at Redwater, Canada, for Imperial Oil, Ltd., has been transferred to Calgary as equipment and general production engineer.

H. S. GIBSON

H. S. Gibson, managing director of Iraq Petroleum Co., Ltd., and its associated companies, has been elected president of the British Institute of Petroleum for the 1952-53 session. He succeeds **C. A. P. Southwell,** managing director of Kuwait Oil Co., Ltd. Before becoming managing director of the I.P.C. group, Gibson was general fields manager of

PERSONALS

Anglo-Iranian Oil Co., Ltd., in Iran. He is a commander of the Order of the British Empire and in the engineering field is particularly known for his pioneer work on the control of limestone reservoirs and the multistage stabilization of gas.

Leroy T. Bossard has resigned as senior mechanical engineer after 19 years with Stanolind Oil & Gas Co., Tulsa, to organize Bos-Co. Equipment Engineering & Manufacturing Co. in Tulsa.

John M. Graham has resigned as assistant supervising engineer in Standard Oil Development Co.'s Esso engineering department to become chief process engineer in Standard-Vacuum Oil Co.'s refining coordination department at New York.

Thomas M. Burke, geologist for John W. Mecom, has been transferred from Beaumont, Tex., to Houston.

A. M. Van Slyke, district superintendent for Transcontinental Gas Pipe Line Corp. at Laurel, Miss., has been transferred and promoted to assistant division superintendent at Eunice, La.

Kenneth W. Germond has been appointed chief geologist for Southern Production Co., Inc. He joined Danciger Oil & Refining Co. in 1948 and came into Southern Production Co. upon merger of Danciger and Southern. He formerly handled subsurface geology and well completion for Sun Oil Co. in Louisiana, Arkansas, Mississippi, Alabama, and Florida.

W. C. Paton, formerly vice president of Sinclair Oil & Gas Refining Co., in Caracas, Venezuela, has been elected a vice president and director of the parent company, Venezuelan Petroleum Co., and transferred to the New York office. He will assist in the management of the company's expanded exploratory and development drilling program. Before becoming vice president of Sinclair in Caracas, he was district manager for the company at Santa Barbara, in eastern Venezuela.

J. W. Williams, toolpusher for Falcon Seaboard Drilling Co., has been transferred from Alvin, Tex., to Bay City, Tex.

John F. Blair, party chief for The Texas Co., has been transferred from Portales to Roswell, N. M.

L. K. Mower, area geophysicist for Shell Oil Co. at Houston, has been promoted to geologist in special problems.

John Thuis, formerly an independent geologist at Vincennes, Ind., has joined Phillips Petroleum Co. at Denver as a geologist.

Robert L. Hoss, petroleum engineer for Humble Oil & Refining Co., Corpus Christi, Tex., has been promoted to senior petroleum engineer at Florey, Tex.

Louis M. Ayers has been promoted from production foreman of Magnolia Petroleum Co.'s Louisiana-Gulf district to district superintendent with headquarters at Morgan City, La.

J. A. McQuilkin, manager of the Southeast Asia marketing organization of Standard-Vacuum Oil Co., has been elected a director of the company. McQuilkin had been in marketing operations in Southeast Asia for a quarter of a century before going to the company's New York offices in 1950 as deputy manager of the marketing organization.

David P. Staples, executive vice president, and Fero Williams, assistant secretary and assistant treasurer of Pacific Western Oil Corp., have been elected to the board of directors of Tide Water Associated Oil Co.

Langdon Williams, formerly a geologist for Ryan Oil Co., has been appointed a geologist for Phillips Petroleum Co. at Evansville, Ind.

John T. Ashford, chief engineer of Texas Gas Corp. (formerly McCarthy Chemical Co.), has been elected a vice president of the company and of its subsidiary, New Ulm Corp. **A. Carl Gladden,** secretary and assistant treasurer, has been named secretary and treasurer of both firms.

Donald R. Teis has been appointed head of the production and engineering section of Lawton Oil Corp., Magnolia, Ark. He formerly was assistant director of the production division of the Petroleum Administration for Defense in Washington, D. C.

DEATHS

Thomas William Paul, 87, who for nearly 30 years was a driller in Borneo, Java, Sumatra, Iran, Egypt, and Turkey, died recently in Petrolia, Ont.

Ed E. Phillips, 72, president of Phillips Oil Co. from 1926 to 1929, died recently at his home in Okmulgee, Okla. He was vice president of Waite Phillips Oil Co. of Tulsa from 1919 to 1926. He was a brother of Frank Phillips, president of Phillips Petroleum Co., who died in 1950, and Waite Phillips, independent operator now living in Los Angeles.

James A. Aber, independent oil operator, died recently in Houston.

Harry M. Joiner, 47, a driller for Camay Drilling Co., died recently at Santa Paula, Calif.

R. E. Beckley, 63, retired assistant manager of the natural-gasoline department of Standard Oil Co. of California, died recently in San Francisco. He was a past president of the California Natural Gasoline Association.

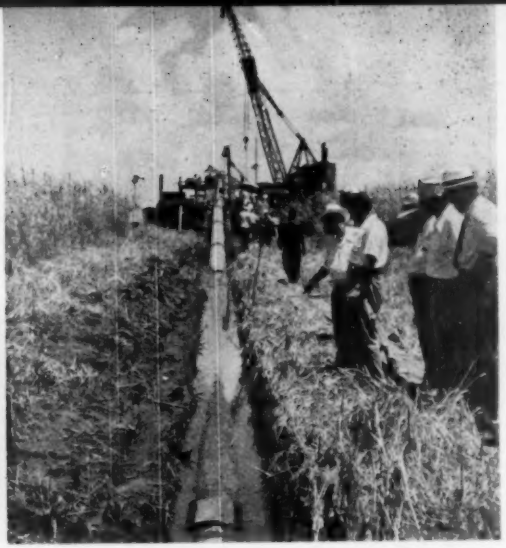
John C. Trefts, 73, president of Farrar & Trefts, Inc., Buffalo, N. Y., who was active in oil development in the Bradford, Pa., area during the 1920's, died recently at his home in Hamburg, N. Y.

George Lynn Rohrbach, 58, formerly chief geologist in Tulsa for W. C. McBride, Inc., of St. Louis, and consulting geologist, died recently in Shreveport, La.

Louis Ravicz, 60, petroleum geologist for Reiter-Foster Oil Co., died in New York May 1.

George W. Campbell, 71, who for 10 years before his retirement in 1950 was an Internal Revenue Bureau specialist in natural resources, died in Washington, D. C., May 4. He formerly was associated with the Warr-Penn Refining Co. at Warren, Pa.

READY FOR THE DITCH.—Coated and wrapped pipe resting on wooden skids prior to lowering-in operations. Four contracting firms are handling construction of approximately 1,000 miles of pipe line.



OBSERVERS.—N. C. McGowen, president of United Gas companies and author of this article, views offshore construction with Roger Wilson, W. C. Woolf, J. B. Storey, and Al Croswell.

N. C. McGOWEN

The Story of

United Gas Pipe Line's $181,000,000 Expansion

. . . the largest such program ever undertaken

Upon completion of program next fall, the delivery capacity of system will have been increased to a maximum of nearly 4 billion cubic feet daily.

by N. C. McGowen

Norris C. McGowen, president of the United Gas companies, completed 38 years of continuous service with United Gas and its predecessor companies in February 1952.

Born in Chicago, he moved to Shreveport in 1913, and in February of the following year joined Atlas Oil Co., which later became a part of the United Gas System. He became general manager of Palmer Corp.'s natural-gas properties in 1918. He was named president of the operating subsidiaries of United Gas Corp. when it was organized in 1930, and was elected president of the corporation in 1944. McGowen is recognized as one of the outstanding industrial leaders of the South.

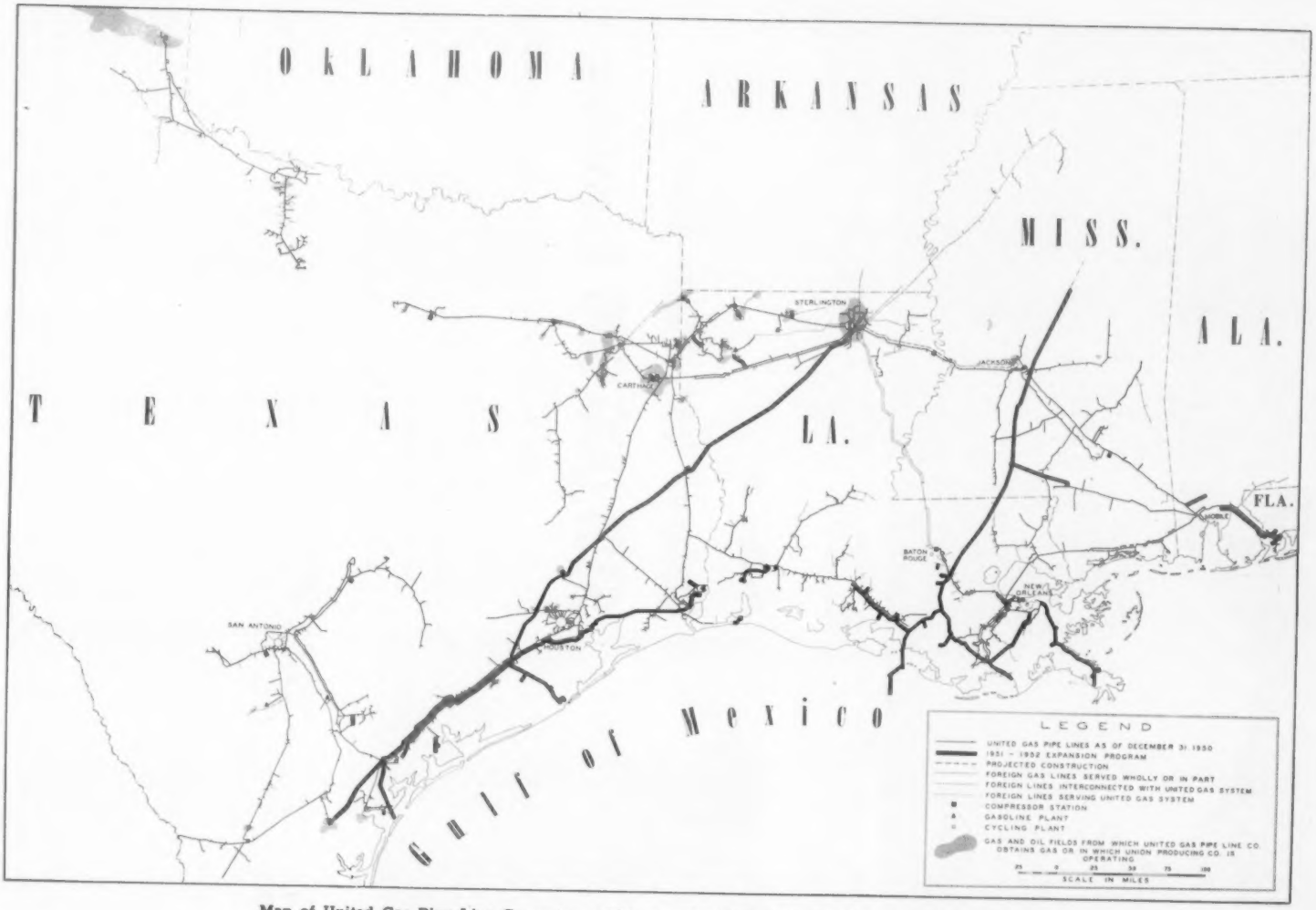
UNITED GAS PIPE LINE CO. is now engaged in the construction of what is believed to be the largest project ever undertaken for the purpose of expanding and reinforcing a natural-gas system.

Total cost of extensions and improvements in Texas, Louisiana, and Mississippi, covering the calendar years 1951 and 1952, is approximately $181,000,000. Major portions of this expansion involve laying of 1,735 miles of pipe lines, ranging from 6-in. to 30-in. transmission lines; construction of the first large-diameter pipe line to tap gas reserves in the Gulf of Mexico off the coast of Louisiana; addition of 64,000 hp. at new and existing compressor stations, and construction of 12 new dehydration plants.

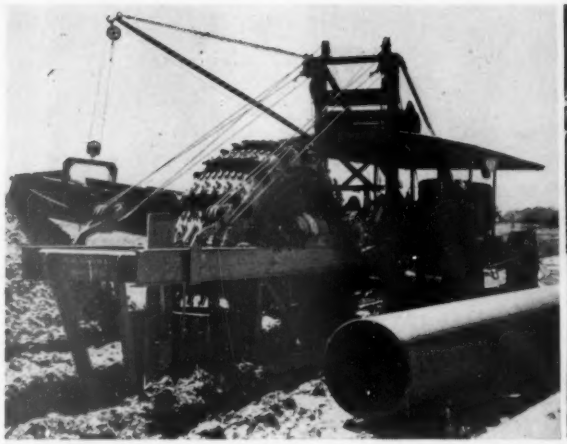
It is anticipated that all of this construction will be complete by the end of the third quarter of this year.

When all phases of work are finished, maximum delivery capacity of United's pipe-line system will have been increased from approximately 3,000,000,000 cu. ft. a day to an estimated total of nearly 4,000,000,000 cu. ft.

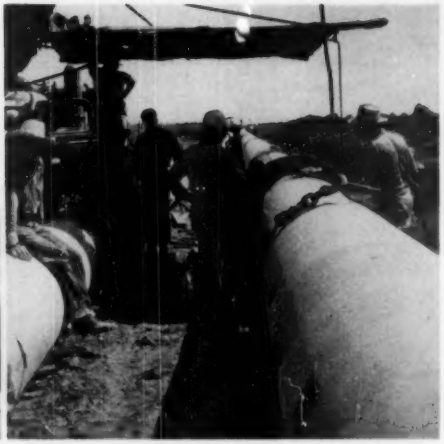
The largest portion of the general expansion project consists primarily of a grid of approximately 1,000 miles of large-diameter pipe-lines applied over the present United Gas system to provide greater capacity, increase flexibility of the system, and to make



Map of United Gas Pipe Line Co. system which accentuates new lines laid in expansion program.



TRENCHING.—Ditching machine digging trench for pipe line between Victoria and Refugio, Tex.



PIPE GANG.—Operations at front end of welding work on an inland section.

available new and additional reserves of natural gas.

One of the most interesting phases of the project is a submarine pipe line which brings into the company's system gas from the Eugene Island area of the Gulf of Mexico. Construction of this line was United's largest underwater pipe-line project since 1941 when the company pioneered in this type of construction by laying 25 miles of 14-in. pipe across Lake Pontchartrain.

Offshore Lines

The Gulf of Mexico pipe line includes 15 miles of 20-in. pipe which was laid toward the site of Pure Oil Co.'s Block 32 drilling platform. A second leg of 14-in. pipe extends from Block 32 to Magnolia Petroleum Co.'s Block 51 drilling platform. The Block 51 platform is about 10 miles from the Block 32 drilling site. These offshore lines were placed in operation in October 1951.

Engineers and contractors who planned the current construction projects faced many new pipe lining problems. Much of this pioneering work started in the laboratory and on drawing boards many months before a single length of pipe could be laid.

Typical of the problems encountered, United's engineers had to know what was on and under the bottom of the Gulf of Mexico, what wave action, currents, and marine organisms might be encountered before they could devise pipe-laying techniques or write specifications for pipe and equipment.

Scientists of the department of oceanography of Texas A. & M. College supervised studies of gulf waters to assist in finding answers to many of the problems connected with the offshore project. Other scientists and technicians made important contributions.

The project will also add a total of 64,000 hp. at four existing compressor stations and five new ones. Additional horsepower will be installed as follows at existing compressor stations in Texas: Refugio, 12,000 hp.; Edna, 12,000 hp.; Goodrich, 7,920 hp.; and Magasco, 2,000 hp. New compressor stations will be located at Agua Dulce, 1,760 hp., and Needville, Tex., 7,920 hp.; Lafayette, La., 4,400 hp.; Montpelier, La., 8,000 hp., and McComb, Miss., 8,000 hp.

Other large items in the over-all expansion program include construction of facilities to increase delivery capacity to the Houston, Beaumont, Port Arthur, and Orange areas. Construction of these facilities is now nearing completion.

Cooperating Companies

A project to bring gas from fields in Plaquemines Parish in southeast Louisiana to the New Orleans area is now complete. The construction of facilities to provide additional gas supplies to the Pensacola, Fla., area was completed early this month.

Engineering knowledge, skill, and practical pipe-lining experience of a number of efficient organizations also went into the over-all project. Under supervision of United's engineers, Brown & Root, Inc., of Houston, handled much of the design work. This firm also was awarded the contract for building compressor stations and dehydration plants and for surveying, right-of-way acquisition, and inspection on large portions of the project.

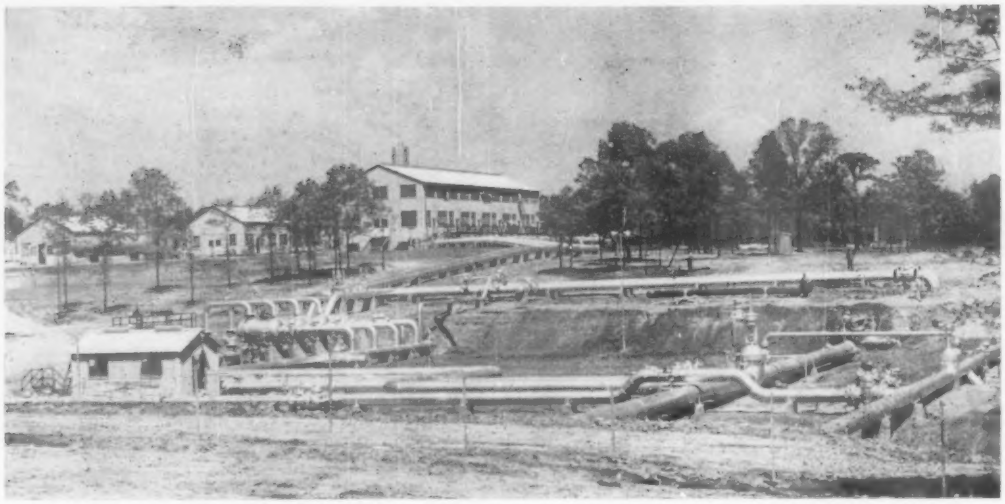
Four contracting firms, grouped under the name of Gulf Southern Contractors, are handling construction of approximately 1,000 miles of pipe line. These firms are Texas-Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott & Co., Inc.; and Morrison-Knudson Co., Inc.

Pittsburgh-Des Moines Steel Co. constructed suspension-bridge crossings of the Colorado, Brazos, and Red rivers. Brown & Root constructed a suspension bridge crossing of Pearl River.

The construction work now nearing completion is one more step in United's steady expansion of facilities to keep ahead of industrial and population growth in the Gulf South region. This territory covers large areas of Texas, Louisiana, Mississippi, southern Alabama, and northwestern Florida. In the period from 1930 through 1951, United Gas has invested more than $435,000,000 in capital expenditures for construction, development, and replacement of properties.

In 1930, when 5 major groups and more than 40 associated companies were welded together to form United Gas Corp., the organization had approximately 5,700 miles of transmission, distribution, and field pipe lines. Ten years later, this mileage had increased almost 100 per cent to 11,260 miles, and at the end of 1951 the total was over 18,500. In 1931, the first full year of operation of the company, United sold approximately 155 billion cubic feet of natural gas. Sales in 1951 were 690 billion cubic feet.

"... One more step ... to keep ahead of industrial expansion in Gulf South region"



COMPRESSOR STATION.—Over-all view of compressor station, piping, and scrubbers at McComb, Miss.

Nine New Compressor Stations Building, Four Others Proposed in United's Expansion

Compressor cylinders at all stations have been equipped with suitable variable cylinder clearances and valve unloaders for maximum utilization of horsepower

by Carroll Smith and M. M. Heller

UPWARDS of 64,000 hp. in new or expanded compressor stations is being installed as part of the expansion program of United Gas Pipe Line Co. during 1951 and 1952.

Nine compressor stations are currently being constructed along the principal lines forming the new grid over the company's system. In addition four others are proposed for future construction at various points on United's lines.

A list of the stations being erected in 1951 and 1952 is shown in an accompanying tabulation.

Agua Dulce.—Gas at two different inlet pressures will be compressed by the four units at Agua Dulce station with two units normally connected to each inlet line. Each compressor unit, however, will be valued to handle the gas in either inlet line. Additional gas at a pressure not requiring compression will bypass the station and mix with the compressed gas all of which will then pass through a dehydration plant and into the 24-in. line to Refugio.

Refugio.—The eight units at Refugio will be connected to three different low-pressure field-gas inlet lines in addition to the comparatively high-pressure new inlet line from Agua Dulce. All the units at this station will not be connected to all four inlet lines, but a sufficient number of units will be interconnected to be able to switch the entire design load of any one inlet line to other units.

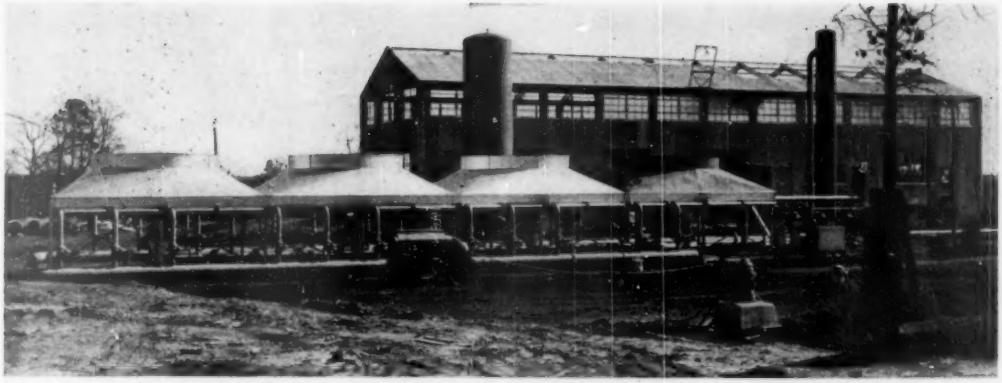
The field gas from the three low-pressure inlet lines will be dehydrated after compression and will be mixed with the new inlet line gas compressed previously and dehydrated at Agua Dulce. The pressure drop through the dehydration plant requires a higher field-gas outlet line pressure in order to mix with compressed dehydrated gas from Agua Dulce. This results in two outlet lines, and thus, this station has four inlet lines and two outlet lines with various units connected to all or part of these lines.

Edna station also has eight units and has a similar piping arrangement as Refugio, but it is considerably simpler as this station has but one low-pressure field line, the gas in which will be dehydrated after compression. The other inlet line at a comparatively higher pressure carries the dehydrated gas delivered from Refugio station. This piping arrange-

NEW STATIONS OF UNITED GAS PIPE LINE CO.

Station and location—	Total hp.	No. units	Hp per unit	Manufacturer name	Designation
Agua Dulce, Texas	1,760	4	440	Ingersoll-Rand, Beaird	8SVG Package
Refugio No. 2, Texas	12,000	8	1,500	Cooper-Bessemer	GMW-6
Edna No. 2, Texas	12,000	8	1,500	Cooper-Bessemer	GMW-6
Needville, Texas	7,920	6	1,320	Ingersoll-Rand	KVG123
Goodrich No. 2, Texas	7,920	6	1,320	Ingersoll-Rand	KVG123
Magasco,* Texas	2,000	2	1,000	Cooper-Bessemer	Type 22
Lafayette, Louisiana	4,400	4	1,100	Clark Bros.	BA-5
Montpelier, Louisiana	8,000	5	1,600	Worthington	UTC-8
McComb, Mississippi	8,000	5	1,600	Worthington	UTC-8

*Two units added to existing four-unit station.



CONSTRUCTION. — Cooling units under construction at the McComb, Miss., compressor station.

ment results in two inlet and two outlet lines with some units connected only to the field gas, others only to the main line gas and the remainder connected to both systems.

Needville, Goodrich, and **Magasco** are principally booster stations with but one inlet and one outlet line. Magasco station, however, will have two of its six units valved for compression of the low-pressure gas in the present system. Gas from the present system will not be compressed for delivery into the new line as is the field gas at Refugio and Edna.

Montpelier station has but one inlet and one outlet line.

McComb station is connected to boost gas north through the 30-in. line, or to boost it through a 24-in. line running in an easterly direction to serve markets in southern Mississippi and Alabama, and Northwest Florida.

Lafayette station is essentially a field station designed to compress low-pressure gas in two stages taken from lines feeding from opposite directions and delivering it through a dehydration plant and into a 12-in. line to the 30-in. Eugene Island-Kosciusko line. Delivery of gas in this manner is expected to be periodic. At other times, the station may be called upon to deliver gas from any one or more of the connected lines to any one or more of the remaining lines.

Actually, this station is manifolded to the four lines so that any one or more lines may be an inlet or any one or more of the remaining lines may be an outlet line. The station is connected so that it may also operate as a single-stage low-pressure station or, as a single-stage high-pressure station. Gas can be bled off at a set pressure between stages or, at the outlet line after dehydration. This flexibility makes it possible to utilize the maximum horsepower of this station under the widely varying demands of the United Gas System.

To meet the varying demands of capacities and pressures, the cylinders of the compressors at all stations have been equipped with suitable variable cylinder clearances and valve unloaders for maximum utilization of available horsepower. Compressor horsepower will be conserved by utilizing the more efficient compressor valves recently developed by the engine manufacturers. Likewise, cylinder bottles or headers and connecting piping is amply sized to minimize pressure losses and aid reduction in pulsations.

The major gas piping is placed aboveground in conformance with modern practice and is arranged for ease in making plant additions. The general scheme of station piping was to place the check meters on the inlet side of the station followed by scrubbers with the outlet of the scrubbers leading to the station bypass or the station inlet. In this way, the gas passing through a station yard would be metered and cleaned before passing into the downstream line section.

The check meters made up of multi-tube orifice meters are valved as a group making it necessary to bypass the meters when orifice plates are to be serviced or replaced. This resulted in a large saving in the cost of valves.

Scrubbers, both the gas cleaner and the separator or liquid knockout type, or a combination of both types, will be installed on the inlet side of all stations. At the stations near the origin of the line where field gas is being transmitted, greater emphasis was given to scrubbers designed for the knockout of liquid, and for these installations the cleaner - separator combination-type scrubber will be used, while at stations farther up the line cleaner-type scrubbers, designed to handle primarily dust, are to be installed.

All the station scrubbers will be equipped with low-level alarms which will be placed on the generator building ridge and with high-level switches to automatically shut down the station.

Compressors

The new compressor units will all be of the angle type equipped with automatic shutdown controls, safety fuel shutoffs for the two-cycle engines, controlled water-cooling quantities and temperatures, oil-cleaning

(Continued on page 145)

The Authors . . .

Carroll Smith has served as design engineer for 21 years of the 24 years he has been associated with the gas industry in the employ of United Gas Pipe Line Co.

M. M. Heller, engineer, has an M.S. degree in mechanical engineering, University of Texas, and a B.S. degree in mechanical engineering, University of North Dakota. For the past 15 years he has been in various engineering activities of United Gas

CARROLL SMITH

M. M. HELLER

FIRING LINE.—Welding operations in a sugar-cane field in southern Louisiana.

INTO THE DITCH.—Coated pipe being lifted from skids preparatory to lowering in.

United's personnel handles

Plans and Design for Construction of 1,700 Miles of Overland Pipe Lines

Engineering and operating groups share equally the responsibility of planning this system of new lines

by D. R. Pflug and V. E. Hamilton

THE 1951 and 1952 expansion program for United Gas Pipe Line Co. included more than 1,700 miles of overland pipe lines. The development of the general plan, the design, and the specifications for these projects have been handled by company personnel.

Lines across the areas traversed by the new project have been built and operated previously by United. Accordingly, it was possible to incorporate in the plans for the new work not only the general improvements and refinements developed by the industry, but also specific details of construction known from experience to be advantageous to the several particular types of terrain crossed.

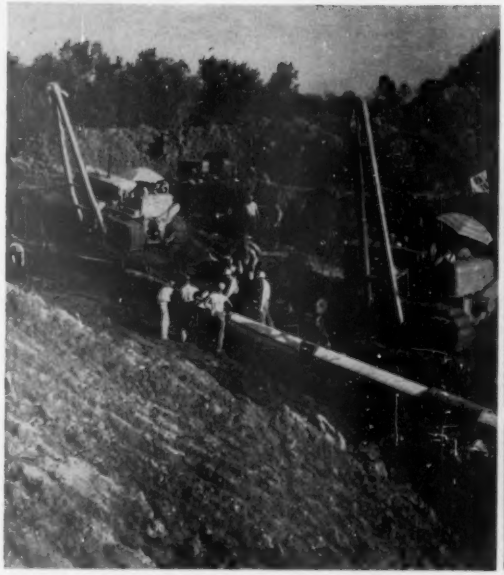
The engineering and the operating groups of the company shared equally in responsibility of planning this system of new lines so that it would meet the requirements of prudent investment, engineering codes, construction practices, and the essentials of dependable operation.

Routing

Having worked out the general plan and location, approximate routes of sections of the project were laid out on government and ownership maps and on such aerials as were available. From this tentative location new aerial maps were made. A final proposed location was then set out on these new aerials and the field surveys were ready to begin.

Right-of-way agents were sent out in advance of the survey parties to secure permission from the property owners for the survey work. Field offices were established along the routes of the line from which some 15 survey parties operated and where the survey notes were rough plotted before being sent to the central office for the drafting of final alignment sheets. This preliminary drafting of the notes in the several field offices made it possible to complete the abstract data required by the right-of-way agents with a minimum loss of time and provided means of preparing special plats and drawings to meet the requirements of the local right-of-way and construction personnel.

Orders for materials had been placed in advance of the execution



PREPARING FOR CROSSING.—Section being readied on Mississippi River bank for installation in river bed.

RIVER CROSSING.—Pipe at Mississippi River crossing is manipulated by barge and tractor equipment.

of the construction contract but when this contract was made the preliminary shipping schedules and destinations were then revised to meet the changing situations and to conform as nearly as possible to the contractor's requirements. All materials were received, warehoused, and distributed by the pipe-line contractor.

In general, right-of-way easements and construction specifications provided for the clearing of a 75-ft. right-of-way, although the width was increased to 100 ft. where canal construction was required across marsh or swampy areas.

Ditching. — Across normal terrain the ditching specifications called for a minimum width of 12 in. greater than the outside diameter of the pipe and for 30 in. of cover. When crossing open water and waterways under the jurisdiction of the U. S. Engineers, drainage boards or other agencies the lines were buried to meet their regulations. Where the lines were laid in canals excavated across marshes and swamps, the pipe was buried below the bottom of same to allow the use of the canal for future inspection and maintenance purposes.

Welding procedures and specifications were worked out jointly by representatives of the company, the pipe manufacturers, the contractor, and the manufacturers of electrodes and welding equipment. These procedures and specifications were approved only after extensive investigations and tests. Manual welding only was employed on the project using A.W.S. classification E6010 and E7010 electrodes.

A rigid and detailed qualification procedure for welders was established including X-ray testing. Complete records of all welders taking these tests were made and distributed to inspectors on the several pipe line spreads. Each welder employed was assigned a steel stencil to identify his work.

Protective coatings varied to meet the local conditions. An asphalt mastic coating was used across swamps and marshes while a prime coat, hot enamel, and wrappers were used on other sections. Several makes of enamels, both asphalt and coal-tar bases, were used. Also both glass and felt wrappers were applied to give added protection.

Coating operations were conducted both at yard locations and along the right-of-way but in the latter case no pipe was cradled into the ditch behind the coating machine. Holiday detectors were used on all types of coatings.

Installation.—No attempt was made to obtain any calculated amount of slack in the lowering-in operation. Consideration was given to the terrain, tie-in connections, weather con-

(Continued on page 121)

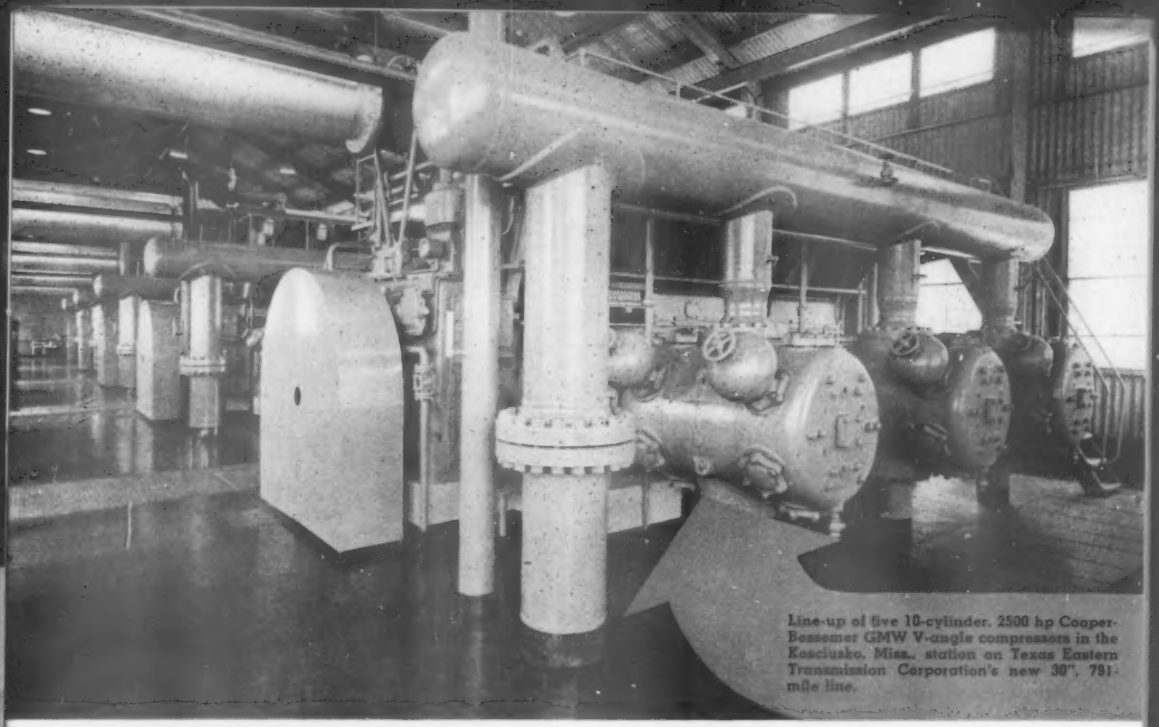
The Authors . . .

D. R. PFLUG

V. E. HAMILTON, JR.

D. R. Pflug, chief engineer of United Gas Pipe Line Co., is a native of Massillon, Ohio. He is a graduate civil engineer of Michigan State College. Pflug worked for 5 years with MaComber Steel Corp., of Canton, Ohio, and 4 years with A. O. Smith Corp. in Houston prior to joining United Gas in 1934. He became chief engineer in 1947.

V. E. Hamilton, Jr., assistant chief engineer of United Gas Pipe Line Co., was born in San Antonio March 29, 1903. He graduated from high school in San Antonio and studied 2 years at A. & M. College of Texas. He has been employed by United or predecessor companies since 1923.



Line-up of five 10-cylinder, 2500 hp Cooper-Bessemer GMW V-angle compressors in the Kosciusko, Miss., station on Texas Eastern Transmission Corporation's new 30", 791-mile line.

Shown here during completion is United Gas Pipe Line Company's Refugio, Texas, station containing eight 6-cylinder, 1500 hp Cooper-Bessemer GMW V-angle compressors.

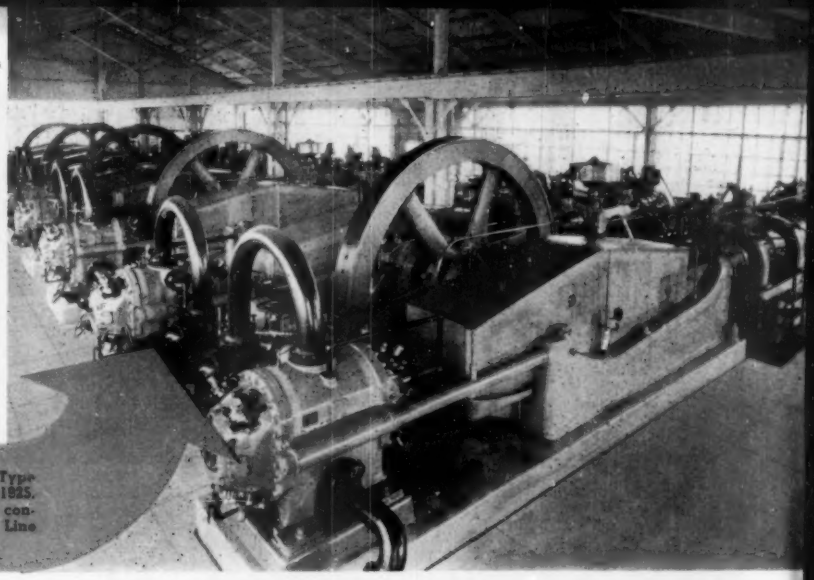
ANGLE V

Compressors

New York Washington, D. C. Bradford, Pa. Parkersburg, W. Va.

San Francisco, Cal. Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle, Wash.

Another Example of Efficient Power at Lower Cost



These five 1,000 hp Cooper-Bessemer Type 22 horizontal compressors, installed in 1925, twenty-seven years ago, are still in continuous operation in United Gas Pipe Line Company's Latex station.

Cooper-Bessemers serving Texas Eastern and United Gas in the

HUGE EXPANSION PROGRAMS

LARGEST expansion of pipe lines in the nation in 1951-52 was the multi-million dollar programs of the United Gas Pipe Line Company and Texas Eastern Transmission Corporation.

And, as shown opposite, Cooper-Bessemer compressors of the latest type, big GMW V-angles, are on the new lines of both these leading companies.

For that matter, Cooper-Bessemer units have been serving pipe line companies all through the years... in fact, from the *early* days of gas transmission. For example, look at that line-up of Cooper-Bessemer horizontal units. Installed back in 1925, they are part of the United Gas system—and are *still* in continuous operation today! Any wonder experience-wise companies turn again and again to Cooper-Bessemer?

If you have compressor needs coming up, it will pay you to check on the latest Cooper-Bessemer developments in efficient, space-saving compressor power.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela

SAFE

with Safety Floor Finish and MULTI-CLEAN Explosion Proof Floor Machines

Safety Floor Finish is a water emulsion wax containing "Ludox"* colloidal silica. Approved by U.L. as anti-slip floor treatment. Safety Floor Finish is non-inflammable and easily applied with a wet mop. Furnished in colors to match floors. May be removed by scrubbing with mild cleaner and water.

All compressor stations will be maintained with Multi-Clean Explosion Proof Scrubbing and Polishing Machines. Proven by past performance. U.L. inspected, G.E. totally enclosed explosion proof motor. Approved for Class 1, group D, and Class 2, groups E, F and G. Three conductor, Neoprene cord. Adjustable handle.

*Trade Mark of E. I. du Pont de Nemours & Co., Inc., Reg. U.S. Pat. Off.

. . . from the Floors Up!

Safety is a prime consideration in floor maintenance equipment in new natural gas compressor stations being erected by Brown & Root, Inc., for United Gas Pipe Line Company and Texas Eastern Transmission Corporation. We were proud to supply them.

Explosion Proof **Floor Machine**

Louisiana Paper Company, Ltd.

Shreveport • Alexandria • Baton Rouge
Little Rock • Monroe • Texarkana • Tyler

ditions, etc., in requirements for slack loops.

Backfilling and cleanup work followed customary practices with the exception that across cane and rice cultivation in some areas the backfill on the 30-in. lines was compacted in layers by the use of a sheep-foot roller to prevent settlement of the new backfill.

All sections were internally cleaned by brush-type plugs and were gas tested both for maximum working pressures and for leakage. No water testing was employed on the overland sections.

Flow Control

Scraper-trap installations were built at all plant sites and at some of the multiple stream crossings and main-line valve installations along the line. The usual full-opening line-size valve was installed together with an enlarged barrel equipped with a hinged blanking head for removing and injecting the cleaning plug.

Main lines throughout the project were equipped with full-opening, full-line-sized valves, both through-port and gate types, some of which are weld end and some flanged end. Tap valves, blowoff valves, meter-station valves, etc., are mostly plug valves of either the venturi or regular pattern. All valves are A.S.A. 600 class, rated at 1,200 psi. working pressure or more, at 100° F. Welds joining pipe-line nipples to weld-end valves were Magnafluxed and X-rayed.

Gas-driven motor operators were installed on all the main-line gate valves with supply lines connected to the pipe line both upstream and downstream from the valve; no automatic closing equipment was provided. Insulating materials were installed on flanged-end valves to electrically isolate sections of the pipe-line system. Long reaches of pipe lines equipped with weld-end valves are segmented by the installation of insulating flanges.

Metering equipment conforms to standard design practices. Pipe taps were used throughout. Meter tubes larger than 12 in. are equipped with orifice fittings of the type requiring pressure blowdown. Meter tubes of 12 in. nominal diameter and smaller are equipped with orifice flanges. Remote-control equipment is installed at critical points to control pressures and volumes to fit the individual requirements of the particular location.

Corrosion Control

Corrosion control will be obtained with selected pipe-line coatings supplemented with 50 small cathodic protection units of rectifier type at an approximate average of 20-mile intervals.

Field surveys were made in advance of pipe-line contsruction, and preliminary designs of cathodic protection units were supplied the right-of-way department, so that easements for the ground beds could be obtained along with the purchase of the pipe-line right-of-way. In order to facilitate future coating tests and adjustment of cathodic protection drainage, each section of the system will be electrically isolated by means of insulated flanged joints at selected points.

Special precautions were taken at all railroad and highway crossings to obtain effective insulation from casing. In addition, test leads will be installed at all highway crossings, as well as a number of other selected locations.

It is expected that the total corrosion-control current requirements will be very low, but the 50 rectifier units will provide good distribution and ample capacity for anticipated requirements. Each of the rectifiers was located at a highway crossing or other accessible point where electric power is available.

Rectifier design provides for inexpensive and rapid change of individual rectifier ratings so that provision can be made after all the units are placed in service to insure that each will operate under normal conditions with maximum efficiency.

River Crossings

A variety of solutions were adopted for the numerous river-crossing problems presented in the extensive region over which the construction program is being undertaken.

Four types of river crossings were designed for the various lines in this project. They are:

1. Overhead suspension bridges.

2. Multiple crossings consisting of three 20-in. lines in which the upstream line was bowed upstream, the middle line laid straight across the stream, and the downstream line bowed downstream. Since for safety reasons wider spacing of the lines was desired in the stream crossing proper, the adopted method of bowing the lines was considered reasonable. Relatively short headers were installed to minimize protection work and maintenance in disturbed areas on the banks.

3. Where lower capacity was required than in the case of Item 2 above, a multiple crossing consisting of two 20-in. lines was laid with one line bowed upstream and the other bowed downstream.

4. At some minor stream crossings it was believed advisable to loop the 30-in. main line with one 20-in. line to be used for emergency purposes in case of a main-line break, but which would nevertheless be in service at all times for capacity purposes. Due to the fact that these streams are generally narrow, and are expected to have favorable characteristics with respect to scouring and channel changes, the distance between the lines was less than that of the other types of crossings, and both lines were laid straight across the stream.

A study was made of the characteristics of each stream to be crossed by the pipe line to determine, among other things, the maximum expected depth at which scouring action in the bottom would occur. The river lines were laid below these points, determined by sounding records prepared by river engineers.

Coating specifications on the 20-in. river lines called for coal-tar primer, coal-tar enamel, Fiberglas, coal-tar enamel, felt wrapper, and an additional protection consisting of either slats or banded rock-shield wrapper. Twenty-inch pipe used in the multiple stream crossings was ½-in.-wall thickness, weighing 104.13 lb. per foot; concrete coating or a sufficient number of cast-iron river clamps was installed to provide suitable negative buoyancy to meet local conditions.

Suspension crossings were installed as follows:

Brazos River, Fort Bend County, Texas: 800-ft. single span for one 30-in. pipe and second 30-in. pipe in the future.

Brazos River, Fort Bend County, Texas: 960-ft. single span for two 24-in. pipes.

Colorado River, Wharton County, Texas: 720-ft. single span for two 30-in. pipes.

Red River, Natchitoches Parish, Louisiana: 1,520-ft. single span with a 760-ft. loaded side span for one 30-in. pipe.

Pearl River, Copiah and Simpson counties, Mississippi: 500-ft. single span for one 30-in. pipe.

Scraper traps are installed at multiple crossings except those on which the main line constitutes one of the river lines. Liquid volume tanks are installed at the upstream side of overhead suspension crossings to entrap liquids which might collect in sizeable quantities ahead of the scraper; this was done to avoid imposing unnecessarily large possible loads on the bridge. Grading and drainage programs on stream banks have been carefully considered to provide effective stabilization of the areas.

The locations of important submarine crossings are as follows:

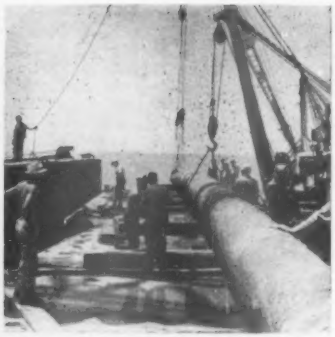
Texas
- Trinity River
- Guadalupe River
- Neches River
- Angelina River

Texas-Louisiana
- Sabine River

Louisiana
- Bayou D'Arbonne
- Ouachita River
- Six Mile Lake
- Mississippi River
- Amite River

Mississippi
- Pearl River—two crossings.

RAMP BARGE.—Located on canal near the seashore is equipment for welding 10,000-ft. sections of 20-in. pipe. The crane swings 200-ft. sections from pipe barge to ramp barge for welding to the line.



OFFSHORE TIEIN.—Ends of two long sections of big-inch pipe are lowered on deck of offshore barge for tiein welding.

RAMP RAILROAD.—Pipe slides down ramp on tracks as it is pulled toward the sea.

Applied research aids in designing and building

United's Offshore Pipe-Line System

by Paul Williams

THE offshore pipe-line system of United Gas Pipe Line Co. enters the Gulf of Mexico at a point due south of Franklin, La. From this point 20-in. pipe extends 15 miles southerly across Atchafalaya Bay and into the open gulf.

At the end of the 20-in. line in Block 32, near Pure Oil Co.'s drilling platform "A," United has constructed a concrete and steel platform rising 40 ft. above the water upon which are placed scraper traps, control valves, and taps for future connections.

Running southwesterly from this platform is a 14-in. line traversing 10½ miles of the open gulf to Magnolia's Block No. 51.

The entire 25½ miles of offshore lines lie within the boundaries of the 1,000 sq. miles of submerged lands known as the Eugene Island area, in which there are now several producing fields.

Planning and project.—Before design details and a complete construction program could be outlined, it was necessary to develop the answers to several important questions, some of the most apparent of which were:

1. Over what route should the lines be laid in order to provide maximum security and to minimize installation and operation costs?

2. What type of coating should be used?

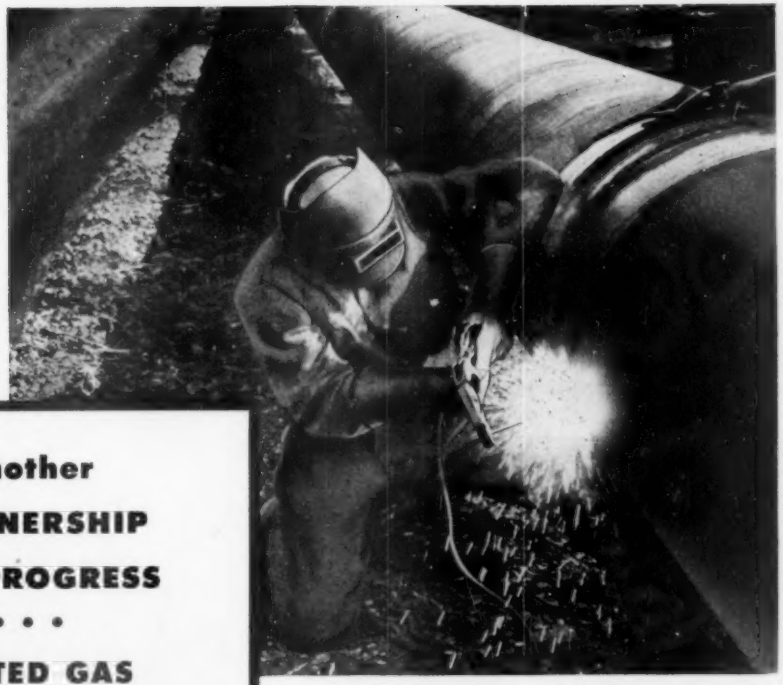
3. What gross weight should the lines have to insure that they would neither sag nor rise in the sediments?

4. To what depth should the lines be buried in order to guarantee protection from action of waves and currents?

5. Should the pipe-line trench be backfilled?

6. What portion of the traverse will be affected by the greatest wave action?

7. What is the magnitude of the



Another PARTNERSHIP FOR PROGRESS • • • UNITED GAS PIPE LINE COMPANY

FIRST names in pipelines depend on the FIRST* name in line pipe

*FIRSTS by A. O. Smith: Welded line pipe • Internal expanded pipe Light wall large diameter pipe • World's largest producer of large diameter welded steel pipe

United Gas Pipe Line Company is now completing one of the largest construction projects in its history. Natural gas from new sources, including one 25 miles out in the Gulf of Mexico, will be gathered in new lines and main arterials to enlarge and reinforce this great producing and distributing system.

A. O. Smith Corporation's contribution to the completion of this huge program will have been the shipment of some 500 miles of 30 inch diameter and more than 300 miles of 18 inch to 26 inch diameter line pipe from its Milwaukee and Houston Works.

It is in such partnerships for progress . . . that A. O. Smith research, and engineering and precision manufacturing play their vital roles in aiding the development of the petroleum and natural gas resources of America.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters

DEPENDABILITY *through* **RESEARCH** *and* **ENGINEERING**

78th ANNIVERSARY 1874 - 1952

A.O.Smith

LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2
Los Angeles 22 • Midland 5, Texas
New Orleans 12 • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3
Washington 6, D.C. • International
Division: P.O. Box 2023, Milwaukee 1, Wis., U.S.A.

OFFSHORE STOVEPIPING.—The 10½-mile, 14-in. line was laid by stovepiping from a barge which was pushed ahead by the pipe sliding into the water

SEA-GOING WELDING.—Welders work on special overhanging platforms built on side of laying barge.

SHIP-SIDE PIPE.—Detail of platforms on side of barge to facilitate welding and covering ends of joints.

wave forces that may affect pipe risers at terminal points?

8. What is the nature of the sediments with regard to chemical breakdown of the pipe-line constituents?

9. To what range of temperature will the pipe be subjected and what effect will temperature changes have on coating?

10. How much actual movement of the lines can be expected to result from thermal or pressure variables?

11. What are the densities, the strengths, and the vertical and horizontal distribution of the sediments along the selected route?

12. What should be done to minimize attack from barnacles, borers, and other marine organisms?

It was believed that although approximate answers to many of these and other questions were reasonably well known, exact quantitative confirmation was justified because of the magnitude and cost of the proposed construction program.

Investigation and research. — The Texas A. & M. Research Foundation was commissioned by United at an early date in the planning stage to accumulate and interpret in the field and in the laboratory such information as was needed to complete the design and construction plans. The organization assembled by the foundation was selected with a view to securing and studying the desired information in five functional groups. These groups of specialists, each assigned to a specific phase of the study, were:

Geology—Group 1. — Primarily the recommendations of this section hinged upon the problem of selection of the optimum route and the optimum depth of burial of the pipe lines considered from an examination of the subsurface distribution of the sediments and the reef structures and from observations of the short and long period changes in water depth expected to occur over the area of investigation.

Supplementary information was also sought on the types of sediment to be excavated and in which or on which the pipe would be laid, together with information on the amount of sediment to be removed along the route to provide both a trench for the pipe and a navigational channel for traffic through the shoal areas, during the construction period.

Waves—Group 2.—The objective of this section was to compile a detailed

(Continued on page 129)

THE AUTHOR

PAUL WILLIAMS

Paul Williams is design and construction engineer for United Gas Pipe Line Co. He attended Oklahoma University and spent 10 years with an oil company in civil and petroleum engineering activities before his first employment by United in 1934.

When the blue chips are down...

it's EXPERIENCE that pays off in pipelining

When you contract with Texas-Louisiana-M-K, your job is in the hands of one of the most experienced pipe line contractors in the business. Operating as River Construction Corporation, the partners in Texas-Louisiana-M-K carried the major responsibility on the world's largest pipe line construction contract for United Gas Pipe Line Co.

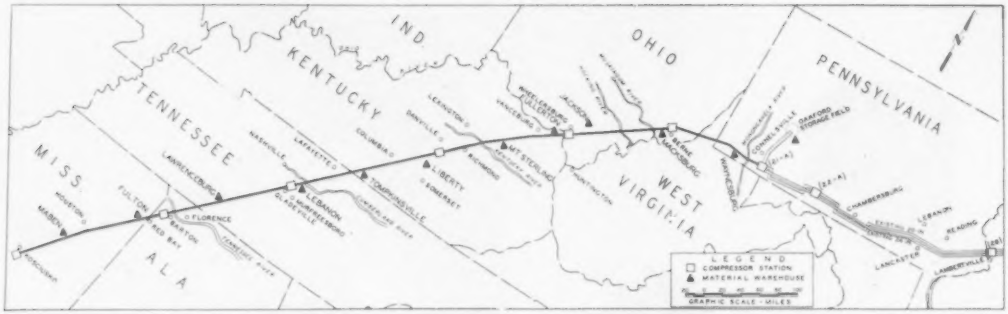
Pipe line construction experience averages well over twenty years for each partner and includes thousands of miles of pipe line involving every construction problem known to pipelining. Such experience pays off for you when you call on Texas-Louisiana-M-K for NEW CONSTRUCTION, MARINE CROSSINGS, TAKING UP AND RECONDITIONING OLD LINES.

TEXAS–LOUISIANA–M–K

PIPE LINE CONTRACTING

Robert Thomas J. C. Briscoe J. C. Minyard

General Offices: 6100 CAMP BOWIE BLVD. • FORT WORTH, TEXAS



Map showing location of pipe line and compressor stations constructed in Texas Eastern's expansion program.

Texas Eastern Transmission Corp.'s

Major Expansion Program Nears Completion

. . . adds new pipe lines, compressor stations, underground storage, and communication facilities

by R. H. Hargrove

FIVE years ago Texas Eastern Transmission Corp. was organized to purchase the Big Inch and Little Big Inch pipe lines which had originally been built for the transportation of crude oil and oil products during World War II. Texas Eastern took possession of those lines under an interim lease on May 1, 1947, for the transmission of natural gas and purchased the lines outright on November 14 of the same year. Under initial operations for the transmission of natural gas, daily delivery capacity was 140 million cubic feet a day, through 2,060 miles of pipe line.

Today Texas Eastern is nearing completion of an expansion program that adds new pipe lines, new compressor stations, an underground-storage field, and new communication facilities to the system. The result—when the program is completed—will be daily delivery capacity exceeding 1.2 billion cubic feet a day, through 4,200 miles of pipe line, using 38 compressor stations and 380,190 hp.

Execution of this expansion program has been under the direction of Baxter D. Goodrich, vice president and chief engineer for Texas Eastern. In two accompanying articles personnel from the engineering department discuss some of the principal features of the line construction, communications, and compressor stations included in this expansion project. Many of the unusual design characteristics appearing in the new facilities are the result of satisfactory experience with similar installations on our existing system, which operated during 1951 at about 101 per cent of designed delivery capacity.

STEEP PULL.—Sideboom tractor towing dope pot up a hill in Tennessee.

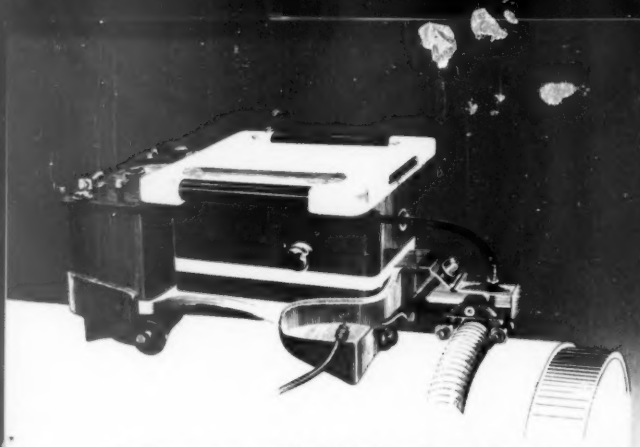
The expansion program, approved by the Federal Power Commission on February 27, 1951, includes construction of 791 miles of 30-in. main line, six new compressor stations on that line, development of Oakford storage field in Pennsylvania, construction of 35 miles of 30-in. line to the storage

Reginald H. Hargrove, president, Texas Eastern Transmission Corp., studied engineering at Rice Institute before military service in France during World War I. After 9 years as manager of Caddo Abstract Co., Hargrove joined Palmer Corp. in 1928.

REGINALD H. HARGROVE

He became vice president of Louisiana Gas & Fuel Co. and subsidiaries in 1929. Following organization of United Gas Corp. he was vice president of all active domestic operating subsidiaries of that company.

In 1937 he became vice president of Union Producing Co., United Gas Pipe Line Co., and United Oil Pipe Line Co. In 1944 he was elected vice president of United Gas Corp. On March 1, 1947, he left the United Gas organization to be associated with Texas Eastern Transmission Corp. He became president May 28, 1947. He is a past president of A.G.A.



The STEARNS ELECTRONIC HOLIDAY DETECTOR

The STEARNS ELECTRONIC HOLIDAY DETECTOR* is an instrument for making high voltage electrical inspection of pipe line coatings, above ground, as the device is rolled along on the coated pipe by an operator. The complete Unit consists of the Generator coupled with an Alarm System, the Rolling Coiled Spring Exploring Electrode and Pusher, and the Carriage Assembly. A small 6-volt storage battery serves as the power source.

THOROUGH INSPECTION

Fundamental precepts which are met by the Stearns Detector are:

(1) To generate a high voltage pulse of short duration regulated to hold the crest *intensity* within narrow limits irrespective of pipe size and the variable moisture conditions experienced during field inspection;

(2) To cause such a pulse to re-occur at a *rate* rapidly enough so as to have entirely traversed the coating surface with successive overlapping circumferential bands of ionization as the testing electrode is moved along the coated pipe;

(3) To *apply*, in a simple manner, these testing pulses to the coating by means of an exploring electrode embracing and self-conforming to the variable shape of the periphery of the coated pipe while being held in electrically effective contact with the coating surface at all times; and

(4) To give out audible and visual alarm signals as an instantaneous response actuated by the formation of a spark between electrode and pipe upon encountering a fault in the coating.

By these principles the Stearns Detector in operation approaches the ideal in testing technique, with maximum safety to the operator, in providing thorough coverage while uniformly subjecting the coating only to the extent of electrical stress necessary to ensure complete inspection.

LIGHT WEIGHT

The Stearns Detector is fabricated from the lightest materials available having the required mechanical and electrical strength. The complete Unit weighs 28 pounds—is 13.5" long, 9" wide, 7.5" high. A welded magnesium case for the Detector, and a wooden box for two 10 pound 6-volt batteries serve as sturdy containers for storage and shipping. The complete shipping weight, including an overnight battery charger, is 75 pounds.

SIMPLE TO OPERATE

The Stearns Detector can be operated without special training or experience on pipes of all sizes. The proper output voltage is set before shipment and the regulation is thereafter automatic—all functions of the Detector being controlled by a single 'On'-'Off' switch. The patented pulse generator, which makes possible such automatic voltage regulation, is an exclusive feature of the Stearns Detector.

DEPENDABLE SERVICE

The Stearns Detector has been developed through eleven years of field experience and continued research and has become the Standard of the Industry. All major parts of the high voltage generating circuit are custom built for their specific functions and fitted together into an electrical assembly of proved dependability. Users of Stearns Detectors are constantly ensured of receiving equipment in new condition as a result of the rigid shop and laboratory maintenance procedures followed by The D. E. Stearns Company.

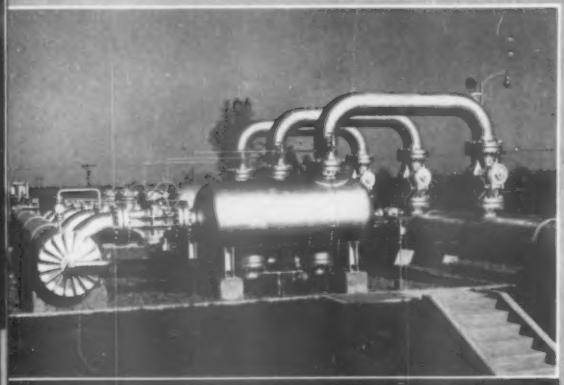
*Patent Numbers Furnished Upon Request.

The D. E. STEARNS Company

SHREVEPORT, LOUISIANA, U. S. A. CABLE ADDRESS: DESCO

BETTER COATINGS CONSERVE STEEL

King Gas Separator...Scrubber



King scrubbers installed on the 30-inch line of Texas Eastern Transmission Corporation near Kosciusko, Mississippi.

King scrubbers at United Gas Pipe Line Company's compressor station near McComb, Mississippi

A revolutionary departure from conventional design, the King scrubber is both a liquid separator and an oil-bath cleaner, combined into a single vessel. It is designed to give *greater efficiency than any other oil-bath scrubber* in separating liquid from wet-quality gas, and dirt from dry-quality gas, without necessitating any change in scrubber set-up. Large capacity of each unit reduces the size and number of scrubbers required per million feet of gas to be handled. This reduces the capital investment required, not only in total cost of scrubbers but also in expense of foundations, fittings and piping.

GREATER GAS CAPACITY

LESS OIL LOSS

REDUCED PRESSURE DROP

LOWER INSTALLATION COST

King scrubbers are in use today by many gas pipeline companies, including several of the largest in the country. *Every one of these companies, after using King scrubbers, has placed an order for additional units.*

We shall be happy to give you complete information on the King separator-scrubber.

King

KING TOOL COMPANY, LTD.

LONGVIEW, TEXAS

field, and construction of six new stations on the existing lines.

The new pipe line extends from Kosciusko, Miss., to Connellsville, Pa. It crosses Mississippi, Alabama, Tennessee, Kentucky, Ohio, West Virginia, and the western part of Pennsylvania. As an interim measure pending the completion of the northern end of the line, the new line is now delivering gas at a point near the Ohio River into the lines of the Columbia Gas System.

FPC approval has been obtained on an emergency basis for a period of 60 days from the date of initial delivery providing for delivery and sale of up to 300 million cubic feet of natural gas per day by Texas Eastern Transmission Corp. to the following 12 Appalachian area companies: Central Kentucky Natural Gas Co., United Fuel Gas Co., Manufacturers Light & Heat Co., Ohio Fuel Gas Co., East Ohio Gas Co., Peoples Natural Gas Co., New York State Natural Gas Corp., Hope Natural Gas Co., Equitable Gas Co., Kentucky-West Virginia Gas Co., Carnegie Natural Gas Co., and National Gas & Oil Corp.

Gas supplies are received at Kosciusko from United Gas Pipe Line Co. under a 20-year contract providing for delivery of up to 387 million cubic feet a day when the new Texas Eastern line is in full operation.

A microwave system will provide radio communication between Shreveport, La., and all points along the new line to Connellsville, Pa., and on from that point to Linden, N. J. This system should be in service during the summer.

Oakford storage, a 19,000-acre underground storage area near Jeannette, Pa., is being developed on an equal ownership basis with New York State Natural Gas Corp., a subsidiary of Consolidated Natural Gas Co. A 35-mile 30-in. line connecting Texas Eastern's main system with the storage area was completed last year, and gas has been injected into storage since the early part of 1951. Plans provide for storing up to 105 billion cubic feet of gas in the field, half of it owned by Texas Eastern.

This expansion program is the largest yet undertaken by Texas Eastern. Two previous major expansion programs have brought the presently operating Texas Eastern System (exclusive of the current new-line project) to designated daily delivery capacity of 740 million cubic feet. Those properties include 3,400 miles of line and 26 compressor stations having 277,650 hp.

United's Offshore Pipe-Line System

(Continued from page 124)

historical analysis of wave conditions in the construction area, to provide information on expected ocean wave characteristics for use in (1) designing risers and pilot structures, (2) planning anchorage for the pipe lines, (3) determining favorable times for line laying and maintenance, and (4) anticipating maximum scour.

Location of the lines.—Field investigations supported by examination of hydrographic charts dating back to 1859 guided the process of laying out the pipe-line traverse.

A series of shell reefs roughly parallel the coast line between the shore and Pure Oil Block No. 32. Winds and tides create a differential water level between the seaward and landward side of the reefs; resulting currents have scoured channels as deep as 60 ft. through the reefs proper in areas where the adjacent water depths are only 8 to 10 ft.

It has been established that the scour channels have become stabilized with respect to both location and depth, but in order to avoid them it was necessary to deviate from a straight line course between the shore and Block No. 32. The pipe-line trench through the reefs are backfilled to the original elevation as a safeguard against creating new scour channels.

Between Block No. 32 and Magnolia Block No. 51 the gulf floor is free from reefs and acreas of concentrated scour action and is therefore laid on a straight line.

Characteristics of the sediments.—From core samples taken at frequent

Congratulations to

TEXAS EASTERN TRANSMISSION CORPORATION
UNITED GAS PIPE LINE COMPANY
BROWN & ROOT, INC.

We sincerely appreciate the part we were able to play in your construction programs.

INTERSTATE ELECTRIC COMPANY
of Shreveport, Inc.

intervals along the pipe-line route the shear strength and the specific gravity of the sediments were carefully determined by laboratory tests. Sediment densities were found to vary from 1.1 to 2.0 and shear strengths from 25 lb. to several hundred pounds per square foot. A coating-and-weighting schedule was then selected for the pipe lines to insure that they would maintain the position in which they were placed and would neither sink nor float.

Variations in temperatures of the sediments were found to be of a low order and it is believed that the bond between the coating and the pipe will not be affected by any difference which may exist between the rates of expansion and contraction of the pipe and those of the coating materials. In addition, the strength of the sediments is sufficient to prevent excessive movement of the lines at terminal points.

Bacteria.—Samples of sea water and marine sediments were examined for the presence of bacteria that had the ability to attack or oxidize coating materials. Such bacteria were found to be present in all the samples. Four different procedures, with various modifications of each, were employed for demonstrating the relative susceptibility of different pipe-line coating materials to bacteria attack.

These testing procedures included (1) demonstrating the growth of bacteria in sea water enriched with the coating materials (2) determining the biochemical oxygen demand of bacteria growing in sea water enriched with coating materials, (3) noting by means of a microscope the perforation of thin films of coating materials on glass slides, and (4) observing decreases in the electrical insulating properties of thin films of coating materials on metal surfaces.

These tests indicated that the rate of attack was such that any of a number of coating materials could be expected to protect the pipe line from bacterial attack for many years.

In order to protect the pipe line from scour and from barnacles and marine borers it was decided to bury the lines to an average depth of approximately 5 ft.

The lines were coated with a jacket of asphalt mastic for protection and reinforced concrete to secure a specific gravity of approximately 1.4.

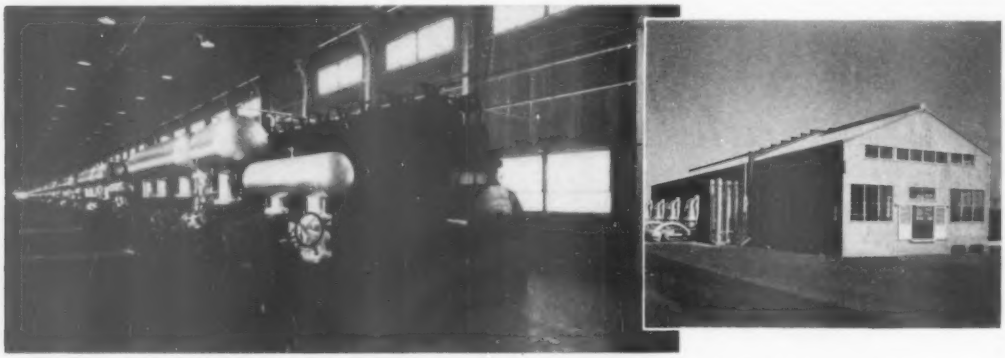
Construction. — The 15-mile, 20-in. section beginning at the shore line was built by Gulf Southern Contractors. Construction was handled by J. Ray McDermott & Co., Inc., one of the firms participating in the Gulf Southern organization. Pipe in this section is 20½-in. o.d. by ¾-in. wall, two-layer construction consisting of 20-in. by ½-in.-wall core with ¼-in. wrap on the outside.

Chemical-composition ranges were favorable from the standpoint of weldability. Extensive laboratory tests were conducted to develop adequate welding procedure, qualification tests for welders, and inspection methods. The pipe was first welded in 200-ft. sections of five joints each, which were in turn shoved and pulled from the shore line in sections of approximately 10,000 ft. in length.

The shoving operations were completed in 59 days. The line was set at its required depth by a combination of jetting and drag-line operations.

The 14-in. line from Pure Block No. 32 to Magnolia Block No. 51 was built by Brown & Root Marine Operators, Inc., using a ramp barge and employing the stovepipe method. This line was hydrostatically tested and when filled with water its specific gravity was raised to 2.0. As a result approximately 4 miles of the line in those sections where the sediment densities and strengths were low, settled to the required depth without the necessity for trenching. The remainder of the line was jetted into position. This line was laid in 31 days.

Conclusions. — Tests indicate that the coating schedule is adequate to accommodate an effective electrical protection program. It is believed that the density of the coated pipe lines is in balance with the combined strength and density of the sediments to such an extent that the pipe lines will maintain their present positions. These positions are thought to be at a sufficient depth to be beneath the zone of damaging effects from waves, currents, and marine organisms.



BUILT FAST--BUILT TO LAST

Whether your needs are large or small, you can save real money and meet your construction deadline by planning your expansion program around STANDARD mass-produced structural steel METALLIC BUILDINGS.

Shop-welded, field bolted METALLIC BUILDINGS are furnished in a wide range of standard sizes up to 130' clear span widths—with optional wall and roof coverings of corrugated asbestos, iron or galbestos.

Standardized yet flexible manufacturing methods permit METALLIC to meet your specifications and personal demands without any sacrifice in METALLIC shop efficiency or appreciable increase in final costs to you.

SO, REMEMBER, THAT IN EFFECT METALLIC GIVES YOU TAILOR-MADE BUILDINGS AT PRE-FAB PRICES.

METALLIC erection crews are available anywhere.

METALLIC BUILDING COMPANY
HOUSTON, TEXAS

DESIGNERS • FABRICATORS • ERECTORS OF PREFABRICATED STRUCTURAL STEEL BUILDINGS FOR INDUSTRY

4601 HOLMES ROAD • PHONE MI-2466

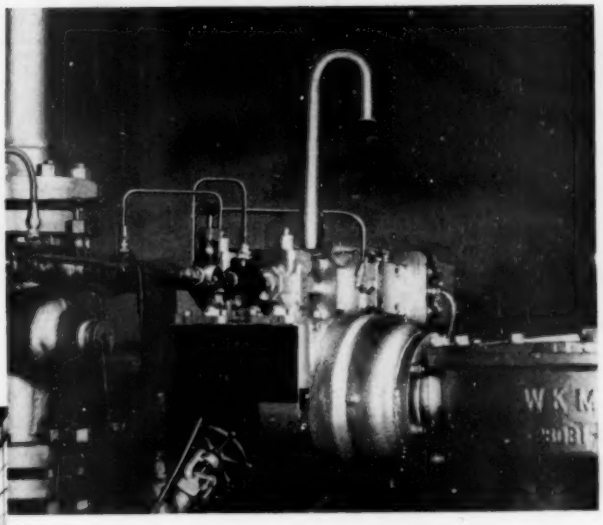
PROGRESSIVE PIPE LINERS SPECIFY . . .

E-I-M

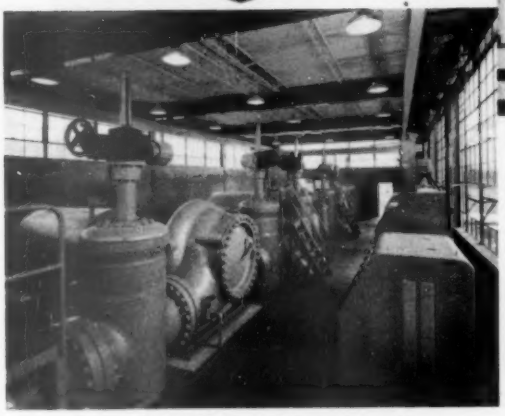
PIPE LINE VALVE CONTROLS

TYPE G-2

TYPE E-3



Some 180 Type G-2 valve controls are employed in Texas Eastern Transmission Company's stations and along the line.



An installation of Type E-3 valve controls in a centrifugal station.

The G2 takes its source of power from the medium in the transmission line, without any pressure reduction. There are no small parts. It's a compact unit with all piping, valving and controls integrally arranged. Field piping is kept to a minimum. Actually, only one small line from the pressure source to the valve control is required.

E-I-M VALVE CONTROLS ARE HELPING TO PROTECT MOST OF THE MAJOR PIPE LINES. IF YOU HAVE A PIPE LINE CONTROL PROBLEM, CHECK FIRST WITH E-I-M. THERE IS A WHOLE FAMILY OF E-I-M STANDARD CONTROL DEVICES, AROUND WHICH ENGINEERS MAY DESIGN THEIR OWN CUSTOM-BUILT VALVE CONTROL SCHEMES. E-I-M VALVE CONTROLS ARE DESIGNED TO OPERATE GATE, GLOBE, PLUG AND BUTTERFLY VALVES, AND THEY MAY BE ADAPTED FOR OTHER PURPOSES. THEY MAY BE OPERATED ELECTRICALLY, PNEUMATICALLY AND HYDRAULICALLY. INSTRUMENTATION MAY BE FULLY AUTOMATIC, UTILIZING VHF RADIO OR OTHER MEDIA.

E-I-M valve controls offer flexibility of installation and operation.
Remember: They may be installed on your present valves in the field.

Write for our descriptive folders.

E-I-M Company INCORPORATED

1340 OLD SPANISH TRAIL • HOUSTON 21, TEXAS • MOhawk 4587

Valve Controls • Speed Reducers • Cooling Tower Drives • Control Valves

SHOT-HOLE DRILLING.—Wagon drills operated by air compressors drill holes for explosive charges for blasting ditch through rocky terrain.

LINE UP.—Pipe gang preparing to line up and apply stringer-bead welding for adding a joint to line. Welders seen in distance complete welds.

BENDING.—Pipe is smooth bent by mobile equipment to fit curves in the ditch.

LOWERING IN.—Five boom tractors lower the 30-in. pipe into the completed ditch.

How T. E. T.'s New Carrier Was Constructed

. . . Safety was foremost in engineers' thoughts in planning line's building, and its communication facilities

by A. J. Shoup and M. O. Morehous

THE engineering staff of Texas Eastern Transmission Corp. investigated all appropriate design codes (including those used primarily by other industries) in preparation for designing and constructing the 791-mile, 30-in. pipe line from Kosciusko, Miss., to Connellsville, Pa.

The uppermost thought in specifying the construction standards was safety of the public, operating personnel, and equipment. To this end, field experiments and research studies were conducted.

Location

The selection of the route of the pipe line was made after intensive investigation. The initial location, as is customary, was made from large-scale maps. The route then was further located by flying the area, making changes to eliminate undesirable terrain and other obstacles discernible from the air. This operation required many flights. Using this information, maps were prepared and submitted to the aerial photographer.

Aerial pictures were made using the location line on the map as a center line for flying the course. The mosaic photograph produced coverage of a strip 3 miles wide over the entire route of the proposed pipe line. The aerial photographer also

ON THE TEXAS EASTERN TRANSMISSION LINE

It's Layne Again

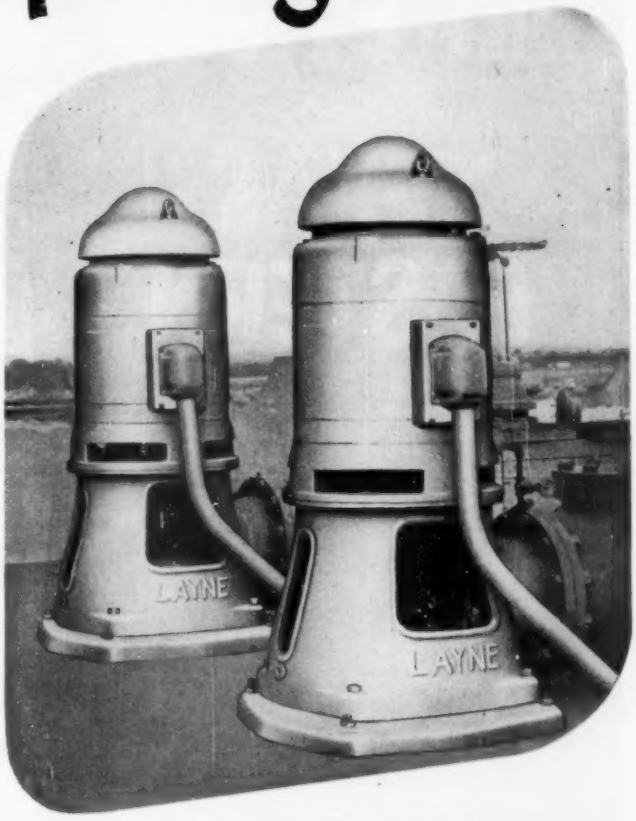
FOR WELLS AND PUMPS

It takes a lot of water to deliver gas where it is needed. This, Texas-Eastern Transportation officials well understood. And just to be sure there would be an adequate supply for all purposes at all times, they selected Layne Wells and Pumps for their entire 791 miles of 30-inch trunk pipe line. For the second time within a few weeks a large pipe line has chosen Layne Wells and Pumps.

All wells were drilled by Layne's own crews and Layne Turbine Pumps were installed and placed in operation by Layne trained installers. When necessary, drilling of permanent wells was preceded by surveys, including test borings, to locate and prove well locations.

As a final check, each completed water supply unit was thoroughly tested by Layne engineers to prove conclusively it was not only functioning properly but would continue giving the dependable and efficient service which every Layne user has a right to expect.

Restrictions in effect prevent mention of number and exact location of the various Layne units now furnishing Texas-Eastern with water. Data concerning these or similar installations are available at Layne general offices.



• BUILT COMPLETE BY LAYNE

Layne undertook the complete development of all water supply units throughout the entire 791 miles of 30-inch trunk pipe line. No other water supply contractor and no other firm's well or pump equipment was needed for completing the contract. There was no divided responsibility. Acceptance of all units without a single rejection is ample proof of Layne usual efficient service.

For information on water supply or water pumps for any petroleum production, refining or transmission need, address

LAYNE & BOWLER, INC. • GENERAL OFFICES: MEMPHIS 8, TENN.

Layne

WATER WELLS

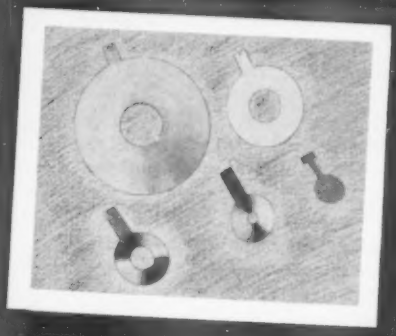
VERTICAL TURBINE PUMPS

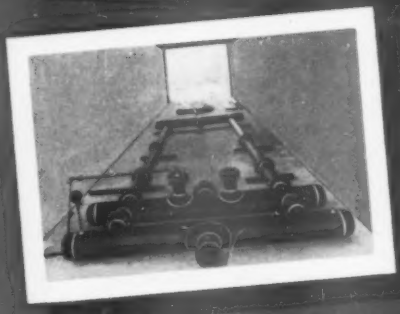
WATER TREATMENT

Congratulations!

UNITED GAS *and* TEXAS EASTERN

On the tremendous growth and expansion of your companies in recent years. We fully realize the great effort, determination and even sacrifice that must become part of each of your personnel involved. We are proud to be a part of an industry that thrives on doing the impossible, even under adverse conditions. May future years see you and our other pipeline customers excel the outstanding records already accomplished in stretching your transmission, field and distribution lines across the length and breadth of our nation.





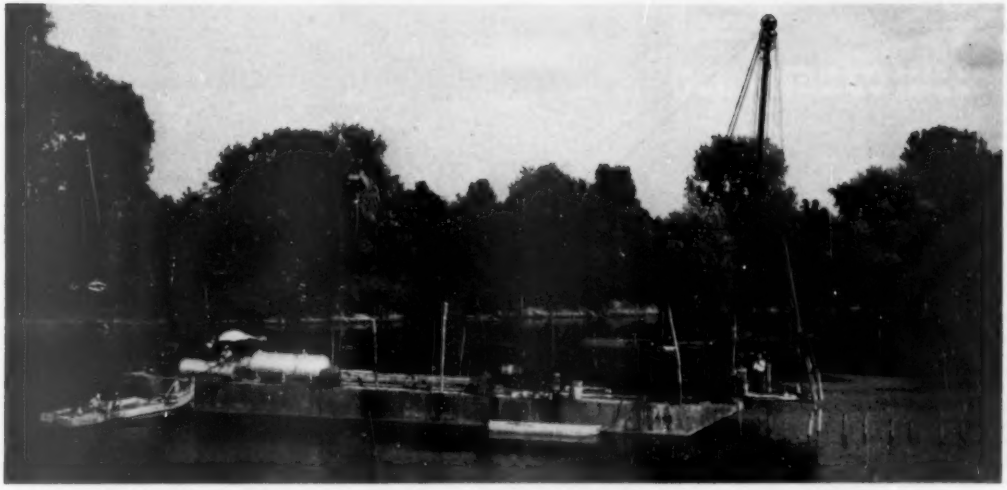
SUPERIOR

IRON WORKS & SUPPLY CO., INC.

1202-04 MARSHALL ST.

SHREVEPORT, LOUISIANA

Pictured are some of the fabrications we furnish the pipe line industry.



SPUDDER DRILLING.—Shot holes being drilled in the rocky bed of the Cumberland River.

furnished stero-optic pictures of the line.

The entire route was studied in the office, using both the mosaic and stereoscopic photographs. In this manner the line was located on the aerial picture, taking advantage of the best terrain. The line was then transferred to regular maps for field use. The aerial photograph and map was used in the field for checking the location on the ground. Many changes were made after the field investigation by the engineers further to improve the location.

All river crossings were selected after an investigation similar to the method used on the line proper.

The ownership was then determined along the route, obtaining abstracts and title certificates, after which purchase was completed.

Design

In general, the design of the pipe line and its appurtenances was based on the American Standards Association's Code for Pressure Piping of 1951, Section 2. Division II standards were used only for the pipe line where no appurtenances existed. All tieins to compressor stations, main line valves, river valves, and meter-station taps conform to the Division I standards.

This standard was also used for all piping within the station area. Whenever the Pressure Piping Code failed to give indications of good practice in certain details, the A.S.M.E. Unfired Pressure Vessel Code of 1950 was consulted.

Scrapers.—Although the company has taken full advantage of running scrapers in the gas stream in its original main lines to keep line efficiency at a high level, this new 30-in. line is the first long transmission line to be equipped with scraper traps specifically for natural-gas service. The original main lines were so equipped because they were built for crude oil and petroleum products service. This fact dictated that full-opening valves be used in all main-line valve installations. The only large lubricated plug valves installed were the station suction, discharge, and bypass valves, all of which are off the main line.

The main pipe line was designed with 30-in. electric fusion welded pipe, 0.375-in. wall, and 52,000-psig. yield to operate at 936 psig. The pipe that had to include the higher safety factors of Division I design was 30-in. electric fusion welded pipe, 0.656-in. wall, and 46,000 psig. yield. The river pipe was the same yield by 0.500-in. wall. All of the above pipe was furnished in 40-ft. lengths and was manufactured in accordance with A.P.I. Specification 5LX. Practically all of it was furnished by two mills.

All branch connections were made in the heavy wall pipe and reinforced with reinforcing pads, not saddles. The decision to use pads was made after full study of both the Pressure Piping Code and the Unfired Pressure Vessel Code, and was based on a reasonable doubt that saddles could properly reinforce the "pull out" stresses caused by a branch connection.

Whenever a change in wall thickness occurred, transition nipples were furnished to make the smooth transition from the thicker wall to the thinner. Since these usually occurred where Division I design met Division II design the nipple had to satisfy the design conditions in both divisions. The end of the transition to be welded to the heavy-wall 30-in.

The Authors . . .

A. J. SHOUP

M. O. MOREHOUS

Andrew J. Shoup, assistant chief engineer, Texas Eastern Transmission Co., graduated from Louisiana State University in 1938 with B.S. degree in civil engineering. From 1938 to 1945 he was engineer for United Gas Pipe Line Co. For 2 years he was with Minor & Shoup, consulting engineers, prior to joining Texas Eastern in 1947.

Myron O. Morehous, T.E.T. pipe-line section head, graduated from University of Michigan with B.S. degree in civil engineering in 1939. He was engaged in engineering for M. W. Kellogg Co., Republic Oil Refining Co., and Empire Structural Steel Fabricators prior to joining T.E.T.

by 0.656 by 46,000-psig.-yield pipe was 30-in. o.d. and 0.656-in. thick.

The other end to be welded to the 30-in. by 0.375 by 52,000-psig. yield pipe was 30-in. o.d. by 0.375-in. thick. In order for this thin end to equal the strength of the 0.375 by 52,000-psig.-yield pipe, the entire transition was made from 52,000-psig.-yield material. The nipples were made from material 0.656-in. thick with the thin end tapered on the inside at a 1 : 4 slope from 0.375 to 0.656 in.

Valves.—Special precautions were taken on welding to all 30-in. valves. On the main-line valves, a 7-ft.-long transition nipple was welded to each end and the blowoff connections inserted in the heavy wall portion of the transition. After the valve-transition weld had been made from the outside, the stringer bead was ground out from the inside and then replaced by welding flush with the inside wall from the inside. These welds were then radiographed.

Since cast-steel valve bodies are factory designed with a quality factor of something like 70 per cent and the weld end of a valve is machined down to match the pipe wall, steps had to be taken to insure a 100 per cent quality factor immediately adjacent to the weld. Therefore, after it had been determined that the valve-transition weld was sound, a magnetic partial inspection (Magnaflux) was made of this portion of the casting. All casting defects found by this type of inspection were removed by grinding and chipping and replaced with sound weld metal.

Main-line block valves were placed at all major rivers and approximately 15 miles apart along the route. Scraper traps were installed wherever a compressor station was being built or wherever a future one might be built. This spacing is about 70 miles.

Future compressor-station sites were located in the original layout so that the suction, discharge, and by-pass valves could be installed during the initial pipe-line construction. The future stations can be built at any time and put into operation without interrupting the operation of the pipe line.

CONCRETE JACKETING.—Wire reinforcing on spacers is put on a section of river pipe prior to manual application of concrete at crossing of Kentucky River.

Head-gate valves at the station were eliminated by keeping the station suction, discharge, and bypass valves at least 200 ft. from the station itself. The aboveground 32-in. o.d. scraper barrels, scraper davit, and scraper gates are also in this area so as not to interfere with station operations.

All large valves (gate and plug) are operated by gas motors designed to operate at line pressure.

The cathodic-protection system is being designed and constructed by Ebasco Services, Inc. Electrolysis test sites to measure potentials from the pipe to the ground were placed on the pipe line every 5 miles. The continuity of the pipe line is broken up by insulating joints about every 70 miles and is completely isolated from the compressor stations in the same manner.

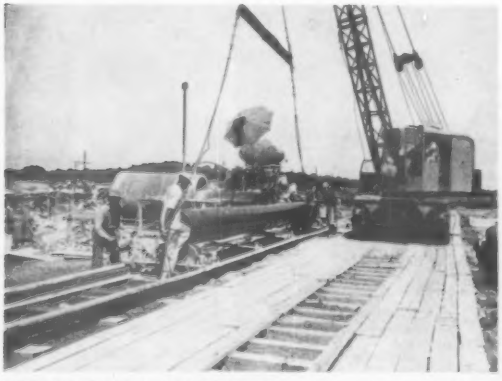
Construction

In order properly to construct and supervise the construction of the line, it was divided into geographical sections for contracting purposes.

Although all pipe-line design work was done by the company personnel, the field supervision of construction was accomplished by Brown & Root, Inc. This firm took competitive bids on each portion and made the awards to the pipe-line contractors. The acquisition, storage, and accounting of materials were done by Texas Eastern's forces.

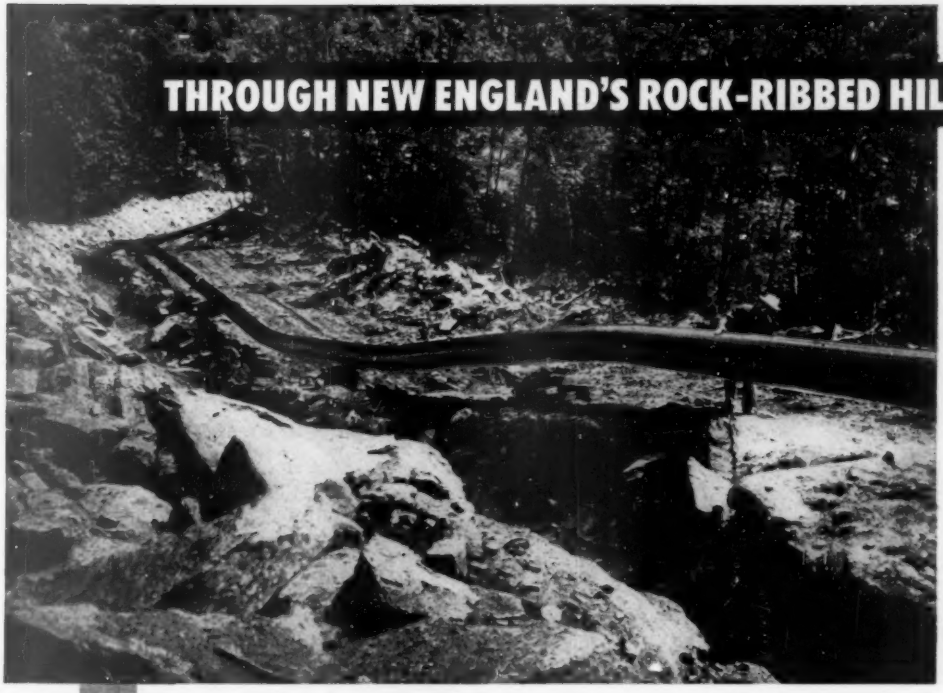
The construction procedures were

(Continued on page 149)



PREPARING FOR JACKETING.—Crane places joint of 30-in. pipe in machine prior to concrete jacketing. Note plank roadway.

JACKETING MACHINE.—Reinforcing wire is wound around rotating, enamel-coated pipe during application of concrete jacketing.



with C. F. & I. WELDED STEEL PIPE

It's C. F. & I. Welded Steel Pipe on the 254-mile high pressure gas transmission pipeline from Lambertsville, N. J. to Boston, Mass., now being pushed through New England's rocky hills.

Contributing in no small measure to its early and successful completion are the special characteristics of C. F. & I. Welded Steel Pipe. Made from quality-controlled, high-tensile steel plates, C. F. & I. steel pipe bends easily... field-welds faster and more uniformly. Hydraulically expanded to accurate size for perfect roundness with precision beveled ends, it can be fitted up and lowered-in with greater speed and ease of handling.

Plates from which C. F. & I. steel pipe is made are produced entirely in our own plant, starting with our own open hearth furnaces — your assurance of consistently high quality.

C. F. & I. steel pipe is available in lengths of 40 feet and in overall diameters from 24 inches through 36 inches. Write for complete information to Claymont Steel Corporation, Claymont, Delaware.

FLANGED AND DISHED HEADS . . . CARBON, ALLOY AND STAINLESS-CLAD STEEL PLATES

CF&I

WELDED STEEL PIPE

PRODUCT OF

CLAYMONT STEEL CORPORATION

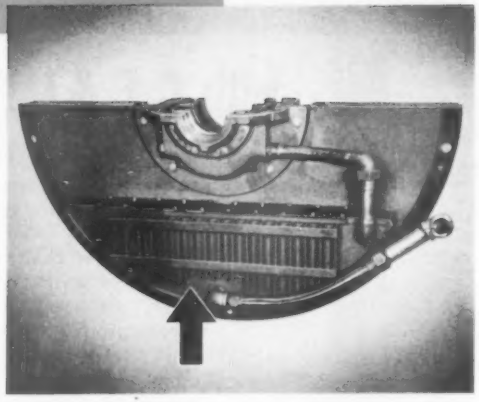
SUBSIDIARY OF THE COLORADO FUEL AND IRON CORPORATION

3 like this for TEXAS EASTERN

This ELLIOTT squirrel-cage induction motor designed especially for pipe line service

Above is shown one of the three Elliott 2500 hp 2-pole motors now serving Texas Eastern Transmission Corporation, driving compressors on the pipe line. Special waterless oil-cooling feature is described at the right. These big motors are built of fabricated steel, engineered for extreme rigidity, ease of access and maintenance, and may be supplied in any type of enclosure, standard or special.

Write for the Induction Motor Bulletin.



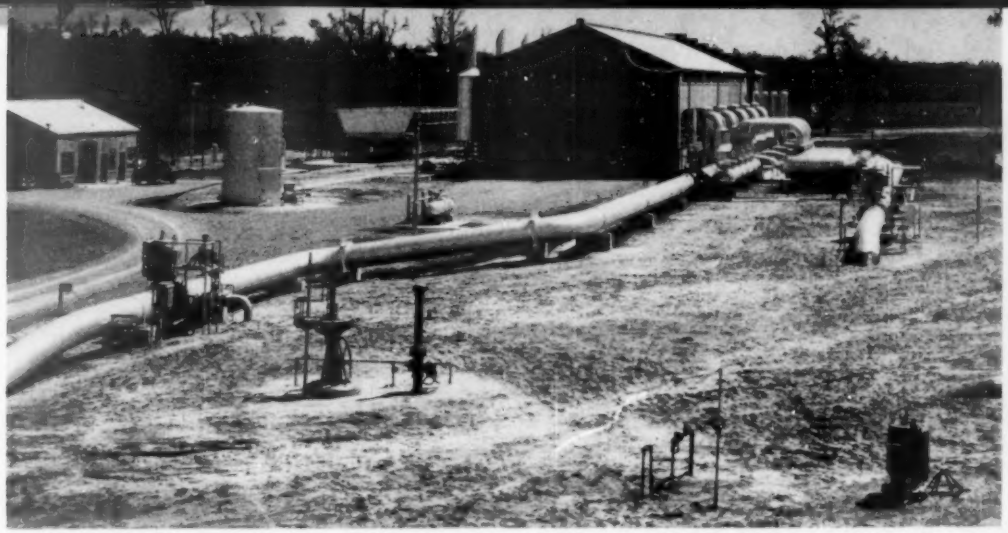
THE AIR-COOLED OIL RESERVOIR is shown in this inside view of a bearing bracket. Note the heat-radiating fins which lie right in the path of incoming ventilating air. This feature not only eliminates the complexities of water circulation apparatus, but better still, makes water unnecessary — a vital factor where water is at a premium.

ELLIOTT Company

Ridgway Division
RIDGWAY, PA.

R 2-22

FOR MOTORS 1—200 HP:
CROCKER-WHEELER DIV., AMPERE, N. J.
Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES



RECIPROCATOR STATION.—Initial compressor station at Kosciusko, Miss., equipped with reciprocating units.

Nine New Compressor Stations Built in T. E. T. Expansion

by Duane P. Smith and W. M. Stephens

THE expansion of the Texas Eastern Transmission Corp. system entails construction of nine compressor stations. Six of the installations will be on the new segment of line which runs from Kosciusko, Miss., northward to Connellsville, Pa., while three of the stations will be constructed as boosters on the existing lines running eastward through Pennsylvania to the New York metropolitan area.

Design and Construction

The system design has been split five-four between reciprocating and centrifugal type stations. The two types of stations are similar in some respects. Provisions for a bypass line, scrubbers, emergency power units, and emergency shutdown controls are approximately the same. A greater number of auxiliaries are required with the reciprocating compressors, for the cooling and starting air facilities. The series layout of the centrifugals is in contrast with the parallel arrangement of the reciprocals.

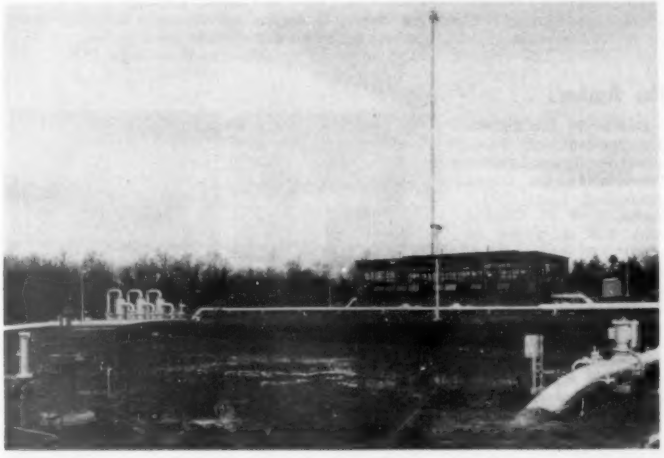
Running from southwest to northeast, the new line begins with a reciprocating station at Kosciusko, southern terminus, followed by two centrifugal and a reciprocating station. The next two stations are centrifugal and the remaining three are reciprocals. Station spacing on this new line is approximately 145 miles.

Reciprocating compressors will be gas-engine driven, while the centrifugal compressors will use electric-motor prime movers. Although the individual station horsepower will vary and the compressor drives are not alike, the general layouts for the stations are similar for each of the two types. Also, both types of stations will install equipment that is either identical or similar.

For example, scrubbers are installed in every station for the purpose of cleaning the incoming gas before it reaches the compressors. These scrubbers will be either the wet type or dry type.

Fin-fan units are used at each of the stations for heat-exchange purposes. At the reciprocating stations water is circulated through closed fin-tube sections where it is cooled and then pumped through the jackets of the compressor and generator engines and lube-oil heat exchangers. Relatively small fin-tube sections are installed at the centrifugal stations. These are for cooling the oil used as a seal for the centrifugal compressors.

Automatic emergency generators are standard equipment for each sta-



CENTRIFUGAL STATION.—Barton, Ala., station equipped with centrifugal compressor units.

PIPING.—Suction and discharge manifolds at Kosciusko station. Two air filters are installed for each engine.

CONTROL.—Centrifugal units are started and stopped by push-button control at console in front of window.

tion. Automatic emergency shutdown systems are included to isolate the stations from the main line and relieve to atmosphere the gas within the area.

The five reciprocating compressor stations are described as follows: The station located near Kosciusko, has a total of 12,500 hp., composed of five Cooper-Bessemer 2,500-hp., GMW-10 units. The station located near Danville, Ky., has a total of 8,800 hp., composed of five Clark 1,760-hp., HBA-8 units. The station located near Connellsville, at the terminus of the 30-in. line and on the existing 20 and 24-in. lines, has a total of 4,400 hp., using four Ingersoll-Rand 1,100 hp. KVG-103 units. The station near Bedford, Pa., on the existing 20 and 24-in. lines, has a total of 6,600 hp., composed of five Clark 1,320-hp., HBA-6 units. The station near Lambertville, N. J., where connection is provided for the Algonquin system, has a total of 4,400 hp., using four Cooper-Bessemer 1,100-hp., GMV units.

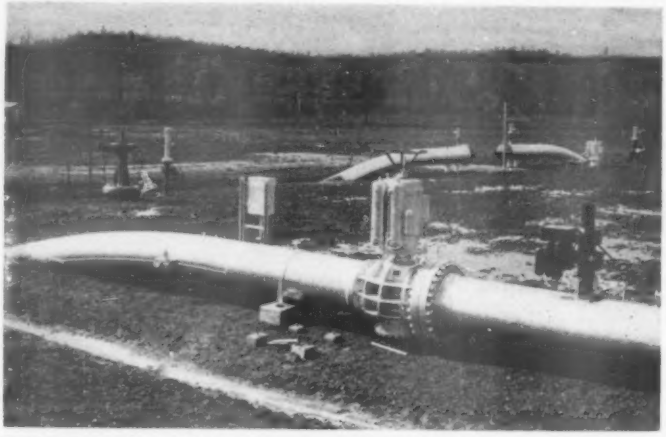
The remaining four stations all use DeLaval, Class BLV, 2,500-hp. centrifugal compressors, direct driven through spacer-type couplings by electric motors. Stations at Barton, Ala., Gladeville, Tenn., and Wheelersburg, Ohio, each have three such units. The remaining station at Berne, Ohio, will have four of these units installed.

In planning the stations, provisions where possible were made for future installation of supervisory control. The anticipated medium for this function is the microwave communications system which is presently being constructed, together with the pipe-line and compressor stations.

Buildings

The compressor buildings for the centrifugal stations have been designed to accommodate the simple piping and to use space advantageously. The relatively small building is constructed using a concrete-slab floor elevated above the ground to facilitate the installation of piping and duct work, a brick superstructure with steel fenestration for light and ventilation, and a flat precast concrete-slab roof. Separate rooms are provided for the motor-driven compressors, the switch gear, and operator's office. The electric motors are base ventilated through a system of ducts for which air is supplied from a blower outside the building.

(Continued on page 152)



REMOTE VALVE OPERATION.—Remotely controlled gas-motor-operated discharge valve in foreground. Electric-motor-operated valves are seen beyond on either side of scraper traps.

The Authors . . .

DUANE P. SMITH

WALTER M. STEPHENS

Duane P. Smith, superintendent of construction, Texas Eastern Transmission Corp., graduated from Oklahoma A. & M. College with B.S. degree in structural engineering. He was engaged in engineering for Sinclair Prairie Pipe Line Co. and Mene Grande Oil Co. before joining Texas Eastern in 1949.

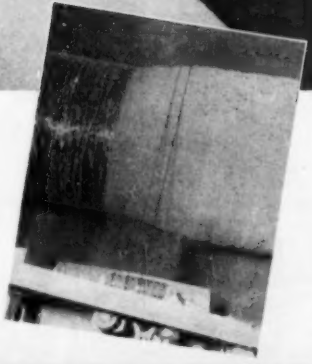
Walter M. Stephens, engineer, Texas Eastern, graduated from Texas A. & M. College with B.S. degree in mechanical engineering. He was engaged in engineering for Gulf Refining Co., Humble Oil & Refining Co., Sinclair Refining Co., Pan American Refining Co., Hudson Engineering Co., Construction Service Co., and Brown & Root, Inc., before joining Texas Eastern in 1950.

Whether your problem is corrosion that requires coating and wrapping or weighting pipe through water, swamps, or rivers, ROSSON-RICHARDS has the experience and know-how to complete the job right. ROSSON-RICHARD Companies, with their years of practical experience, are ready to move in and do the work right on your spread.

Pipe Wate-Koted by Rosson-Richards being laid in the Gulf and adjacent swamplands.

Two Pipeline Problems Solved by ROSSON-RICHARDS

ROSSON-RICHARDS plants are prepared to give you the finest pipe coating and wrapping service available. In the plant or on the job their facilities provide fast and dependable service to rapidly moving pipeline operations.



If pipe is to be laid in water where weighting is important, WATE-KOTE is the answer. WATE-KOTE, developed by ROSSON-RICHARDS, is a pipe-coating material of unusual high density and strength which provides the maximum weight and protection. It is rapidly replacing the use of heavy-wall pipe and cast iron and concrete river clamps and is far superior to the ordinary concrete coating. The high specific gravity of the aggregate which is used instead of sand and gravel, and the method of its application to the pipe are the secrets of WATE-KOTE's high efficiency.

WATE-KOTE being applied.

RR ROSSON-RICHARDS COMPANY

ROSSON-RICHARDS PROCESSING CO.

HOUSTON • CORPUS CHRISTI • CHARLOTTE, N. C. • JACKSON, MISS.

L. T. BOLIN
Vice president, Brown & Root, Inc., and author of accompanying article.

M. P. ANDERSON
Brown & Root's chief engineer, who supervised the entire job.

D. E. WARFIELD
In over-all charge of field offices for both expansion projects.

"Jobs Will Be Finished on Time," Says Engineering Firm Cooperating on Projects

by L. T. Bolin

AT a cost of over 200 million dollars, two vast networks of gas pipe lines are being constructed to span nearly 1,800 miles. These two projects—a system for United Gas Pipe Line Co. and one for Texas Eastern Transmission Corp.—were scheduled for completion 18 months after the start of operations.

Despite shortages of both technicians and materials, these two jobs will be finished on time. This is a tribute both to the men staffing the jobs and to the latitude and authority given Brown & Root, Inc., by the two owners.

United Gas

For United Gas, Brown & Root is:

1. Surveying and buying the rights-of-way and making the alignment sheets. This job, of course, had to be done before the contractors for the pipe line (Gulf Southern Contractors) could begin construction. It meant over 60 right-of-way men had to deal with hundreds of landowners in Texas and Louisiana and buy a strip of land a minimum of 50 ft. wide by nearly 1,000 miles long through these two states. This work was done under considerable pressure, which seems to be a characteristic of right-of-way work.

2. Designing and building dehydration and compressor stations. The United Gas docket called for compressor stations aggregating 63,000 hp. at various intervals on the system. Under the general supervision of Brown & Root's chief engineer, M. P. Anderson, all this work was headed up by the assistant chief engineer, H. M. Anderson. Brown & Root is doing this construction with its own forces, and at the peak will have some 1,500 men at work.

3. Purchasing and expediting materials. With the exception of major items such as compressors, all purchasing and expediting are being done by Brown & Root, using both the facilities of the Houston office and the job office set up in Shreveport.

4. Warehousing and receiving of materials. Warehouses were set up at Tylertown, Miss., and Richmond, Tex., in addition to those at each compressor station. This chore of seeing that every required item is available the minute the construction forces need it is no small one.

5. Accounting. Since every bolt and screw and every dollar of cost must be strictly accounted for, a small army of office personnel is required in the Shreveport office of Brown & Root. W. M. Mahaffey, as office manager, supervises nearly 100 people in this work.

6. Inspection of the pipe line. Actual laying of the pipe on this project was let independently to Gulf Southern Contractors, a joint venture headed up by Robert Thomas. Coventurers are Texas-Louisiana Contractors, Oklahoma Contracting Co., J. Ray McDermott, and Morrison-Knudson Co., Inc. Supervision and inspection are done by Brown & Root.

7. Supervising and inspecting construction of housing. A total of 105 five and six-room houses are being built at the compressor-station sites under subcontracts.

8. Offshore work. Brown & Root supervised and inspected the laying of the first large (20-in.) line in the Gulf of Mexico, a distance of 15 miles from a point near Burns, La., to United's platform adjacent to Pure Oil Co.'s Block 32 drilling platform in the open gulf. Brown & Root with its own forces laid 10½ miles of 14-in. line from the Pure block to Magnolia Petroleum Co.'s platform in Block 51, adding more reserves to the line.

The entire United Gas job is the responsibility of H. G. Twyman, project manager.

Texas Eastern

Brown & Root's contract with Texas Eastern for its 772 miles of 30-in. line from Kosciusko, Miss., to Connellsville, Pa., is much the same as that with United Gas. For this job a project office was set up in Nashville, Tenn., under Project Manager F. L. Terry, and the job is directed from this office with the exception of purchasing, expediting, engineering, and supervisory help from the company's main office in Houston.

...in laying

Pipe Line!

EQUIPMENT PLUS MANPOWER . . . that's **EXPERIENCED MANPOWER**, is the difference in laying pipe lines on schedule. Western Pipe Line Constructors, Inc. is proud of its experienced men for the splendid record they have set in completing the toughest jobs on time.

PIPE LINE
WESTERN
AUSTIN, TEXAS
CONSTRUCTORS

JAMES P. NEILL • President
CHAS. S. LENOIR • Vice President
E. G. MORRISON • Secretary

WESTERN PIPE LINE CONSTRUCTORS, INC. • AUSTIN 2, TEXAS

General field office in Nashville for handling the Texas Eastern Transmission Corp. project.

Section of drafting room in Shreveport office for United Gas project.

A view of the general office at Shreveport for the United Gas contract.

Corner of the invoice audit section of the Shreveport United project office.

Unlike the United Gas contract, Brown & Root surveyed the right-of-way but did not buy it, and Texas Eastern furnished the alignment sheets. Brown & Root designed and is building all the 13 compressor stations aggregating 96,400 hp., and also awarded bids from subcontractors for line laying. As with United Gas, Brown & Root inspects all pipe line work.

An office force in Nashville about the same size as that in Shreveport was set up under Office Manager G. M. Chambless. Because of the similarity of the two projects, both offices are under D. E. Warfield.

Starting in Mississippi, the pipe-laying contracts were let as follows:

Sections	and Contractors	Miles
1, 2.	Williams Brothers-Davis Co.	160
3.	Eastern Pipe Line Contrs.	75
4.	H. B. Zachry Co.	70
5.	Oman Construction Co.	75
6.	N. A. Saigh Co.	80
7.	Mahoney Construction Co.	95
8, 9, 10.	Anderson Brothers	217
		772

Begun the first of February 1951, both these giant projects will be in operation in the summer of 1952.

Supervisory personnel of Brown & Root for the various phases of these two jobs is as follows:

United Gas: H. G. Twyman, project manager; L. E. Damon, purchasing of right-of-way; E. D. Newman, project engineer; M. P. Anderson and H. M. Anderson, design of compressor and dehydration stations; Fred Duke, station construction.

J. Grady Gray, purchasing and expediting (both projects); W. M. Mahaffey, office manager; K. C. Biedermann, chief inspector of pipe line; L. M. Koch, housing inspector; D. E. Warfield, chief office manager (both projects).

Texas Eastern: F. L. Terry, project manager; Loyd Harleston, chief inspector of pipe line; G. M. Chambless, office manager; F. A. Ford, surveying right-of-way; L. A. Wolverton, station construction (southern section); W. S. Osgood, station construction (eastern section).

H. G. TWYMAN
B. & R. project manager for United contract.

F. L. TERRY
Project manager for the Texas Eastern contract.

H. M. ANDERSON
Assistant chief engineer for both projects.

W. M. MAHAFFEY
Manager at Shreveport for United Gas project.

United's New Compressor Stations

(Continued from page 115)

devices, and such instrumentation as is necessary for efficient operation.

All the compressor units except those at Magasco, Goodrich, and Needville will be driven by two-cycle engines while those named will be driven by four-cycle engines.

To safeguard two-cycle engines against the danger arising from trapping gas in power cylinders when shut down, provision has been made for automatic valving arrangements which close the fuel-gas valve and open the valve from the cylinder leading to the atmosphere thus venting the cylinder. The engines are also equipped with the standard overspeed, excess-temperature, and low-oil-pressure safety devices.

Cooling water to the engines is supplied through two separate water systems flowing in separate circuits with different temperature ranges and cooled in dry-type coolers. The dry-type coolers are equipped with three-speed multifans controlled by the outlet engine jacket water temperature.

One system is used to cool the lube oil and where necessary the compressor cylinders. Water for this system is circulated with motor-driven pumps selected to give sufficient standby so that one pump could be out of service for repair with the remaining pump or pumps able to carry the full load. The engine jacket water is circulated by pumps, each belt-driven from a compressor engine. In two stations, thermostatically controlled bypass valves will be installed in the jacket water system as an auxiliary to the dry cooler fan controls in an effort to maintain a constant temperature differential across the engine cylinder.

Lubricating oil will be continuously cleaned by filtration through fuller's earth bypass filters in order to prevent excessive acidity and will also be filtered by full-flow cellulose filters and metal strainers to remove foreign matter in the oils.

This cleaning will be supplemented by a batch oil filtering system for oil removed from the units during maintenance periods.

Combustion air for the engines will be filtered in conventional-type air filters. The make and design have been selected for a low-pressure drop through the filter. Various makes will be used at the various stations.

Mufflers or snubbers of the engines were selected to produce a reasonable reduction of the exhaust noises. Different makes were selected for the different engines. To prolong the life of these mufflers and reduce the usual heavy maintenance, the outside surface of the mufflers was metalized with aluminum.

Fuel gas at a particular station will be connected to all sources of supply and will be regulated in a dual system and measured before being supplied to the engine fuel header. Provision has been made to preheat the fuel gas to eliminate freezing of the regulator during low-temperature periods. These meter and regulator stations will not be housed but will be located close to the compressor building.

Starting air for the station will be provided by two large-size motor-driven air compressors and one small gas-engine-driven air compressor for emergency use. Air from these air compressors will be stored in large tanks located within close proximity of the main compressor building. These tanks will feed into a large header in the building to provide ample supply of air with little reduction in pressure during starting operations.

A low-hazard ignition system for the engines will be supplied by low-tension magnetos to spark plugs. Magnetos are connected through relays to the automatic shutdown system.

Principal gas pressures and jacket-water temperatures will be measured with both indicating and recording instruments. The indicating instruments will be located in the main engine room and the recording instruments will be located in the tele-

Where to buy

Write for STOCK LISTS, issued regularly on:

(1) Motors

(2) Valves & Fittings

Exceptional inventories backed by PEERLESS service. Enjoy the difference. LET US FILL YOUR NEXT ORDER.

We have furnished many

LADISH

Seamless Welding Fittings and Fleet-Line Welding Pipe Saddles used by United Gas on its new pipe line.

PEERLESS
SUPPLY CO., INC.
SHREVEPORT, LOUISIANA

Branch at Natchez

phone building just outside of the compressor building.

Power.—Purchased power is utilized at approximately half the stations. At such stations standby generating equipment provides for emergencies. Electric-generating facilities are connected for multiple operation and are equipped with voltage regulators for constant voltage generation. The main feeders are built up in switchboard panels as are the indicating lights which indicate the electric pumps and fans in operation. The switchboard is of the enclosed drawout type set into a lean-to off the generator building to provide a minimum building requirement with a maximum of safety of operation.

Dehydration.—In those stations near the origin of the lines where field gas is handled, dehydration is necessary. As previously explained, in these stations the gas will be compressed, cooled, and then dehydrated before being put back into the main line.

Cooling of the gas ahead of the dehydration units increases the effectiveness of the dehydration unit. This cooling of the gas is done in open-type coolers in mechanical-draft cooling towers. Water for these towers is circulated by motor-driven pumps selected to give full standby in case of required maintenance of one pump. The fan motors of the cooling tower are all two-speed motors and are equipped with safety switches so that individual motors cannot be operated from below during maintenance periods.

To reduce the size of the units, all dehydration units are installed on the discharge side of the station. Dehydration units have been designed with generous dimensions and special arrangements of the desiccant beds, all of which represent modifications of standard practice to conform with United's requirements at minimizing pressure drop, prolonging the life of the desiccant, and increasing its efficiency in drying of the natural gas.

Layout

Layout of the buildings and station piping are made with an eye to possible expansion. The buildings, in general, are corrugated asbestos-covered steel buildings. The compressor buildings all have full-size basements for greater accessibility to the piping and better serviceability for the equipment. The building is also designed for maximum ventilation and natural light. All the other station buildings except the office will be of the same general design as that of the main compressor building. The office building will be of asbestos-shingle-covered wood-frame construction.

The general plant will be enhanced by a scheme of painting. The outside vessels and piping will be painted aluminum with black trim. The valve handwheels are to be painted safety yellow. The floors of the main and generator building will have a concrete colored green topping. The structural steel will be painted a light gray to blend into the gray of the asbestos covering. The engines will be painted a light green with black trim. Cranes, flywheels, and other hazardous equipment will be painted safety yellow and fire equipment will be painted safety red.

Residences for the station personnel will be provided at the station site. General service furnished by the station will be installed and will meet with the standard approved requirements. These residences will be five-room asbestos-shingle-covered frame dwellings, each with separate garages of the same construction.

Water at the various stations will be provided by motor-driven deep-well pumps. Where necessary the water will be treated according to its use. Cooling water for the closed system of engine jackets and oil coolers will be treated at most plants in deionizers to reduce the scale content to a reasonable minimum. Hard waters at residences will be zeolite softened and cooling-tower waters will be handled as required to reduce the scale deposits on the cooling coils.

Safety

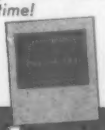
Greater safety will be built into all the station piping systems by providing remote control of station gas valves and automatic shutdown of

X-RAY... POSITIVE "SEE-ABILITY" THROUGH WELDS

Industrial X-Ray Engineers provide the most positive and practical weld-control method ever attainable. Why risk the error possible in visual inspection when X-Ray inspection as developed by Industrial X-Ray Engineers results in an accurate, overall picture of the complete weld in a matter of minutes. A picture, that when properly evaluated, immediately reveals hidden defects. The same film provides a valuable record for future reference.

FIRST to develop equipment capable of X-Raying a complete circumferential weld with a *single* exposure . . .

FIRST to develop and use X-Ray equipment *inside* a pipeline, Industrial X-Ray Engineers have the accumulated know-how, the equipment and the organization to provide you with far better weld-control *on any job, anywhere, any time!*

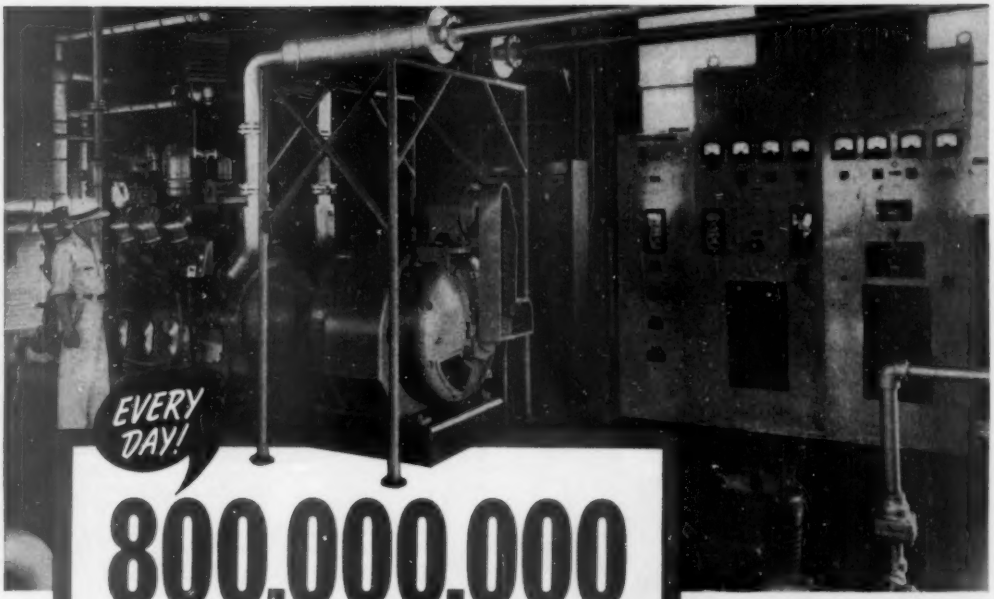


FREE! Write for illustrated booklet "Fundamentals of Pipeline X-Ray."

Industrial X-RAY Engineers

P. O. Box 1256-F Tulsa, Oklahoma

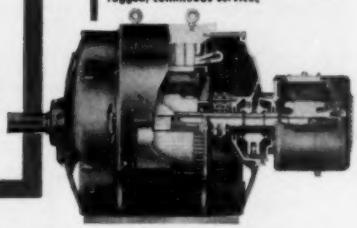
Representatives in: Tulsa, Okla. Portland, Ore. Edmonton, Alberta
Seattle, Wash. Philadelphia, Pa. Venezuela, S. A.



EVERY DAY!

800,000,000
CU. FT. OF GAS
SAFEGUARDED BY *Standby* POWER UNITS

Below is a cutaway view of an E-M Synchronous Generator. A heavy duty type, it features a direct-connected exciter. Designed for top efficiency in rugged, continuous service.



E-M Synchronous Generators ready for emergency action at Texas Eastern gas pipe line stations

With a tremendous daily gas pipe line volume such as this, *protection equipment* can be just as vital as production equipment. Planning ahead to meet any power emergency, Texas Eastern Transmission Corporation has equipped its compressor stations with standby power units.

Essential part of the unit at the Lebanon, Ohio reciprocating station (above) is a 375 kva, 1200 rpm E-M Synchronous Generator.

If high line power should fail at this station, the E-M Generator immediately supplies emergency power to operate the station. When main power is restored, the Generator synchronizes with the central power line and a relay drops off the standby unit. It is ready again for instant service whenever needed.

How much is this emergency power worth to you? In most cases, cost of the standby unit is only a fraction of the losses which might be caused by a major system breakdown. E-M's widely-used High-Speed Synchronous Generators, ranging from 1.25 to 5000 kva, are designed and built for consistent, dependable service under a variety of operating conditions.

Call your nearest E-M sales engineer for his recommendation on your requirements. Or write and ask the factory for *E-M Synchronizer* No. 35.

ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

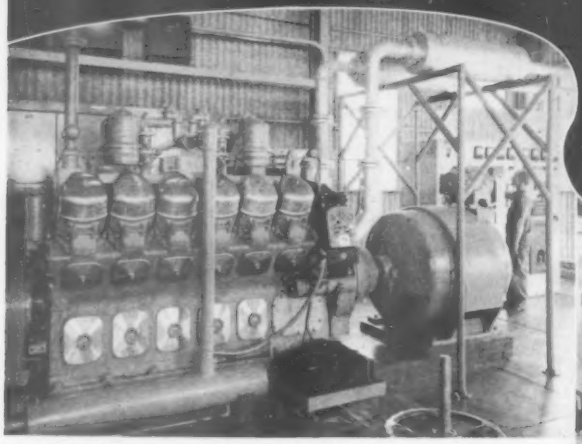
Specialists in
DEPENDABLE POWER APPARATUS

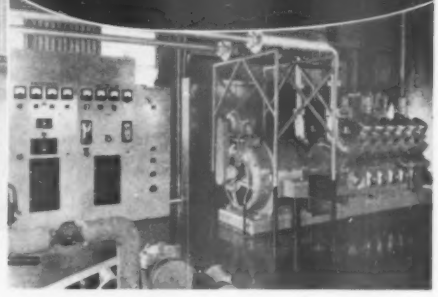
3100-TPA-2109

DEPENDABLE Power-EFFICIENT Service

READY WHEN NEEDED !

Major
Pipeline Company's
Compressor Stations





Standby Le Roi Engine-Generator Sets and Control, 300 Kilowatt Capacity

Major companies have to be SURE of power when they need it . . .

Here are views of two standby units in service at Texas Eastern Transmission Corporation natural gas compressor stations. Texas Eastern has seven Le Roi units.

For 42 years Southern Engine & Pump Company has been serving industry with Power Units for every requirement. Skilled mechanics, competent engineers and friendly helpful service are always available to serve you. We invite your inquiries.

SOUTHERN
ENGINE & PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS

DISTRIBUTORS

DIESEL ENGINES, GASOLINE ENGINES, NATURAL GAS ENGINES, BUTANE ENGINES, ELECTRIC GENERATING UNITS, PUMPS AND PUMPING UNITS.

SERVICE FACILITIES AT:

HOUSTON—DALLAS—KILGORE—SAN ANTONIO—EDINBURG—CORPUS CHRISTI, TEXAS
HOUMA AND LAFAYETTE, LA.

these valves and of the compressor units.

Certain gas valves will be remotely controlled from the generator building. By pushing a single button, it will be possible to simultaneously operate both inlet and outlet valves as well as stop all the compressors. In addition, each of these valves as well as other valves will be remotely operated by push-button control from the generator building to either open or close the valve.

The bypass valve will not be connected to the automatic push button in order to allow the inlet and outlet pressures of the station to equalize before this valve is opened. These valves are equipped with hydraulic motors operated on natural gas from the pipe-line system. Flow of gas to these motors will be valved with solenoids to allow push-botton control of the supply of gas to these motors. Gas for these motors is taken into a separate piping system which is fed from all sources of gas in the plant yard through check valves.

Stations will be shut down automatically in case of a line break in gas headers within the station yard. Shutdown is accomplished by a Mercoid differential switch actuated by gas escaping rapidly through an orifice from a 4 by 12-in. bottle from which stored pressured gas escapes through the orifice to the line when a break occurs. The operation of this Mercoid switch acts to close the inlet and outlet station valves and to stop the compressor engine. Stopping of the compressor units automatically is accomplished by grounding the magnetos through a system of relays.

How T. E. T.'s New Carrier Was Constructed

(Continued from page 136)

typical of normal practice on large-diameter lines. These will be discussed briefly. The width of right-of-way for the most part was furnished to the contractor as 75 ft. Some places were restricted to less due to land owner's requirements.

The ditch was required to be 44 in. wide and sufficiently deep to provide 30 in. of cover. An unusually large portion of some sections of the line involved rock excavation. One contractor used as many as 10 sets of twin drills at one time in an effort to keep ditch prepared ahead of his other operations.

All bending was done by the cold smooth-bending process. Although the contractors used the manufacturers' standard bending machines for the ⅜-in. thick pipe, they found that the 0.656 wall pipe was too stiff. In order to get the heavy-wall bends made without heating, it was necessary for Texas Eastern to provide a specially built machine rugged enough to handle the huge loads.

PLS *Announces...*

ANOTHER COATING AND WRAPPING MILL AT FRANKLIN PARK, ILLINOIS

The Last Word in Protection for Your Large-Diameter Pipe

These modern facilities include large ovens for drying pipe, grit cleaning machines, thermostatically-controlled melting kettles and other special equipment designed and built by PLS engineers at Franklin Park.

This new mill, designed specifically to handle pipe sizes up to 30 inches in diameter and 60 feet in length, provides the very latest facilities for coating and wrapping pipe, incorporating all of the important advancements in pipe protection perfected by PLS over the last 21 years.

Today, more than ever, you can depend on PLS to give you more for your money in cleaning, priming, coating and wrapping.

PLS

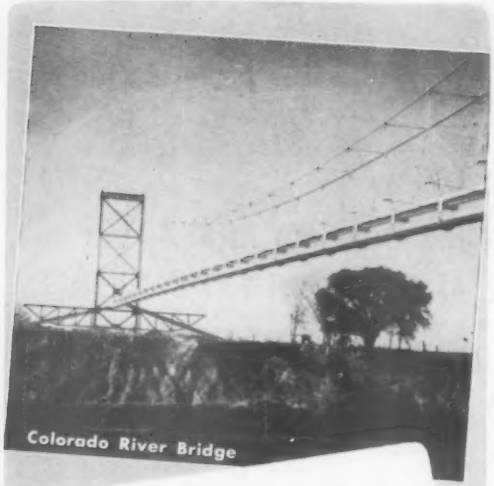
PIPE LINE SERVICE CORPORATION

Pioneers in Steel Pipe Protection

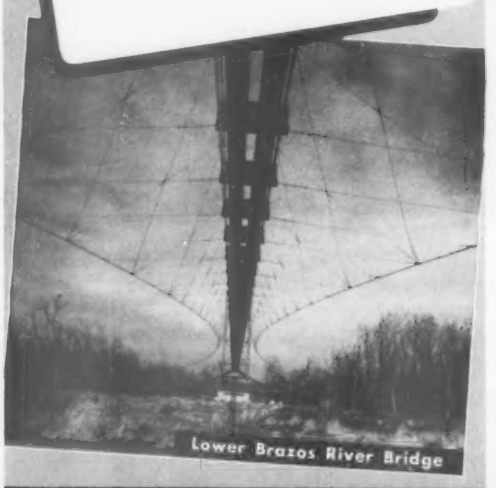
General Office and Plant: Franklin Park, Illinois

Plants at Glenwillard, Penna.; Longview, Texas; Corpus Christi, Texas; Harvey, La.; Sparrows Point, Md.

21 Years of Dependable Service

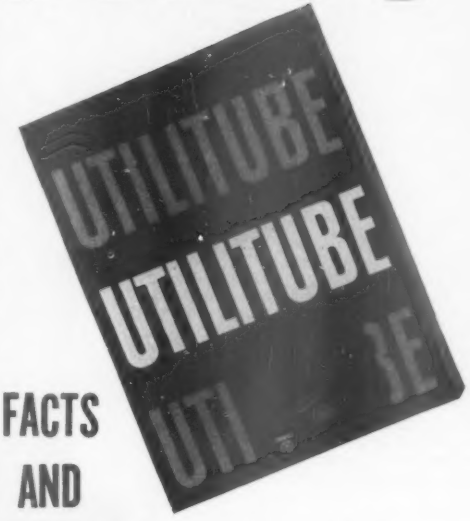


United Gas plans thoroughly and well in assuring its customers of the Gulf South uninterrupted service.



MATTHEWS & KENAN
CONSULTING ENGINEERS
19th Floor Transit Tower ★ Fannin 6462
SAN ANTONIO, TEXAS

NEW



FACTS AND TECHNICAL DATA ON ALCOA'S NEW, ALL-PURPOSE COILED TUBE

Send for this new booklet describing Alcoa's new aluminum coiled tube—UTILITUBE. Alcoa UTILITUBE is designed for instrumentation, fuel, air and lubrication applications. It is easier to form, flare and bend than annealed copper. It will save you up to 40% on tube costs—gives you 3 times more feet per pound. It comes in standard 50- and 100-foot lengths and in economical, long lengths up to 1,000 feet in some sizes. And aluminum fittings are now available from leading tube fitting distributors. Write:

ALUMINUM COMPANY OF AMERICA
839-E Gulf Building • Pittsburgh 19, Pennsylvania

ALCOA

Welding. — The pipe-line welding was done by the down-hill procedure using Fleetweld No. 5 rod for the stringer pass, and Fleetweld No. 85 for the hot, filler and cap passes. All pipe was delivered with 30° factory bevels. It was required that the hot pass be run immediately after the stringing as a precaution against stringer cracks.

Because of the large number of steep grades that the pipe line was traversing, qualification tests for the welders included a test in the 45° position. Most tests were also radiographed before the usual destructive tests. Radiographic inspection of welding was done by the gamma-ray process and included approximately 10 per cent of all welds on the cross-country portion and all welds on the river crossings.

No double jointing by automatic welding was done. Contractors did have the right to propose this procedure subject to Texas Eastern's acceptance but none of them exercised this right.

Several manufacturers furnished the coating materials. It was all coal-tar enamel reinforced with glass-fiber wrap and topped off with kraft paper. Electronic holiday detectors were used throughout. An extra coating of enamel and felt wrap was used at rivers and creeks. Although cradling in the ditch could be allowed if proper precautions were taken, most of the construction was done with entirely separate doping and lowering operations. In rocky ground the contractor was allowed to furnish and apply rock shield in lieu of dirt padding.

The line was completely tested to a minimum pressure of 1,125 psi. Practically all of it was tested with water requiring sections isolated so that the hills and valleys would not cause excessive head pressure at any point. The fact that the line was built with full-opening valves and scraper traps facilitated removal of the water after the test.

All major river crossings were done by individual contracts, with Texas Eastern furnishing them the pipe already coated and "wate coated." In order to do this, a central yard was set up in Pride, Ala., (near the Tennessee River crossing) where all river pipe was processed. It was then hauled to the individual sites. Of the major river crossings, the Tennessee River was by far the longest, approximately 5,000 ft. The following crossings were made with a 30-in. main line and a 24-in. auxiliary crossing:

Tennessee River
Cumberland River
Kentucky River
Ohio River (south crossing)
Muskingum River

The following major river crossings were made with only a single 30-in. line:

Hocking River
Ohio River (north crossing)
Monongahela River

The concrete jacketing used on the major river crossings consisted of the baryte type. It was applied .2-in. thick on the 30-in. o.d. by ½-in. wall pipe and 1½-in. on the 24-in. o.d. by ½-in. wall pipe. At minor stream crossings, negative buoyancy was obtained by using iron river clamps.

Immediately following construction, a crew was provided to check on whether settlement had caused any short circuits between the pipe line and casing at highway and railroad crossings. A casing filler was used to protect that portion that would not be protected by the normal cathodic-protection system.

Work is progressing in the determination of cathodic protection necessary. The whole new line will be protected within a short time following completion of pipe line. Advance information available indicates very little applied protection will be necessary to the 100 per cent coated pipe line.

Microwave

Towers and houses has been completed for the 1,400-mile microwave communication system from the Shreveport office via Kosciusko, Miss., and Waynesburg, Pa., to Linden, N. J. This was designed by F. Vinton Long, communications engineer. It is the second-longest microwave system in the country.

Braden Buildings
United Gas Pipe Line Company Station
near McComb, Mississippi

We are proud to announce that the United Gas Pipe Line Company selected Braden Prefabricated Steel Buildings for all stations on their new pipe lines.

This is a compliment to the experience and ability of our engineering staff and plant fabrication personnel.

MAKE YOUR NEXT STEEL BUILDING A BRADEN BUILDING

BRADEN SECTIONAL STEEL BUILDINGS

BRADEN STEEL CORPORATION
1007 East Admiral Blvd., P. O. Box 1229
Tulsa 1, Oklahoma

DISTRICT SALES OFFICES
Houston — Memphis — Dallas — Denver
Shreveport — Amarillo — Donna, Texas

REPRESENTATIVES
Kansas City — Wichita — St. Louis
Oklahoma City — Fargo — Scottsbluff

ENGINEERS • FABRICATORS • ERECTORS

The system is of the pulse-time modulation type, which will provide eight channels for early operation. Later these can be increased to a total of 123 voice channels and several hundred channels for telemetering and supervisory control functions.

A unique feature is the provision for indication of any failure in tower obstruction lighting for warning airplanes, so that replacements may be quickly effected.

In early stages of operation some telemetering will be done. The microwave system has been designed so that at a later date supervisory controls can be added for the remote control of compressor stations from a central point such as Shreveport. Both the compressor stations and the microwave system have been designed to facilitate supervisory and direct control.

In addition to the 56 microwave stations there are 28 very-high-frequency stations for communicating with mobile equipment and compressor stations.

The V.H.F. facilities can be connected to the microwave system so that any vehicle can communicate with any other vehicle or with the office or stations.

The only carrier current is a short 7-mile operation for telemetering in the Waynesburg area.

ADSORBENTS—DESICCANTS—DILUENTS

Duck's Feathers

AMAZINGLY REPELLENT!

From watery depths they come up dry.

Floridin Adsorbents

AMAZINGLY EXTRACTIVE!

From a compound or a deeply impregnated mass they draw out the elements that are responsive to their nature.

WHERE there is a mutual aversion between two materials, they "just won't mix." Where there is a natural affinity, their power to seek out and hold each other may be almost beyond belief.

For over forty years Floridin has been studying the mutual attractions and repulsions of various substances and making these peculiarities useful to industry.

FLORIDIN ADSORBENTS

There are twenty-odd Floridin products—adsorbents and desiccants, all—and the purposes for which they have been successfully employed are great in number.

If you have a problem in research or in production to which these highly specialized products might be useful, you are invited to consult the Floridin staff without obligation.

FLORIDIN COMPANY

ADSORBENTS—DESICCANTS—DILUENTS

Department C, 220 Liberty St., Warren, Pa.

Nine New Compressor Stations Built by T. E. T.

(Continued from page 140)

At the reciprocating stations a conventional industrial-type building is constructed, using a concrete-slab floor elevated above the ground to provide for the piping and with a superstructure of steel and corrugated asbestos. The compressors are separated within the same building from the water pumps, generator, and switch gear by a brick firewall.

In the construction of these stations all fabrication has been performed in compliance with Section 2, Division I of the A.S.A. Code for Pressure Piping. To follow the code, weldments and special fabricated fittings are stress relieved and X-rayed, with an additional Magnaflux inspection made on cast steel units. Transition nipples are used when it becomes necessary to connect to different wall thicknesses of pipe, fittings or vessels.

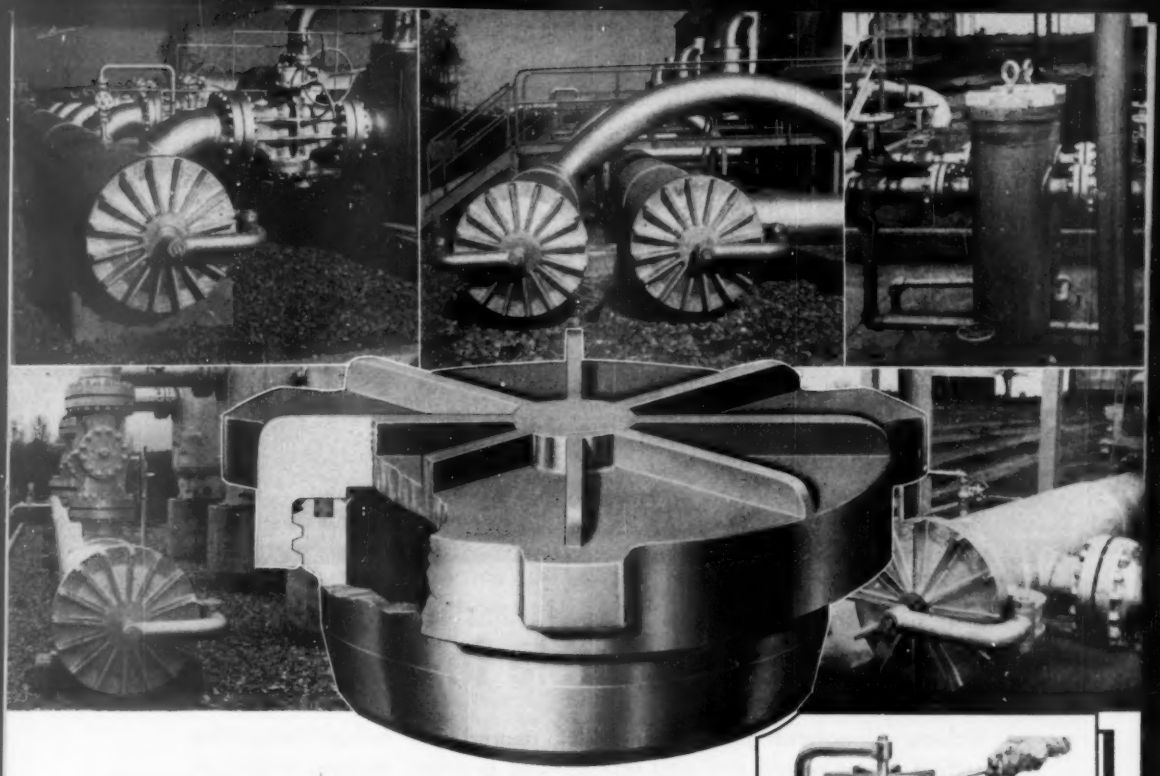
The automatic shutdown system installed at all stations, powered from main-line gas, uses pneumatic motor-operated plug valves on the main-line suction, discharge, and bypass as well as for the station blowdown. At remote locations three push-button stations and one manually operated valve are installed, any one of which when operated initiates a sequence to close the suction and discharge valves and open the bypass and blowdown valves.

An additional feature is provided using a special control which will be automatically activated in case of a rapid drop in pressure such as would be caused by line rupture. This control performs the same function as the operation of a push-button station or the manual valve.

This system, common to both type stations, is supplemented with a Mercoid switch, operated from the same pneumatic system, to interrupt the Rectox ignition to the reciprocating engines and trip the main circuit breaker of the electric motors in the centrifugal stations.

At the centrifugal stations small integral-unit emergency shutdown systems protect from loss of seal oil, lubricating-oil pump failure, loss of ventilating air for the electric motors, overloaded compressor, or high-temperature bearings. A combination flag-alarm annunciator board advises the operator of the point from which such trouble originates.

Each station, whether reciprocating or centrifugal, has only two main buildings on the plot. The first, of course, is the compressor building, which has been described above, and the second, a combination office, garage, and warehouse building to furnish a separate office for the station chief and storage space for equipment, tools, and miscellaneous supplies required in the operation of a station.



TEXAS EASTERN SELECTS

Yale 2-Piece Unions

Use of YALE Blanking Cap Unions on Texas Eastern's great new gas transmission system is further testimony to the many advantages found only in YALE'S modern 2-piece design.

YALE 2-Piece Blanking Cap Unions provide that one indispensible requisite . . . a positive seal against pressure or vacuum . . . plus easier handling, lighter weight and lower original and maintenance costs. These are the reasons so many new crude oil, gas and products lines are using YALE Unions throughout.

Congratulations to Texas Eastern. We're proud to be a part of this great system.

EASIER SEALING: YALE Unions do not require hammering. Positive pressure or vacuum seal is obtained by snapping up the cap with the spanner wrench furnished with each union.

EASIER HANDLING: The cap is **one piece** . . . it's easier and safer to remove, lift and replace.

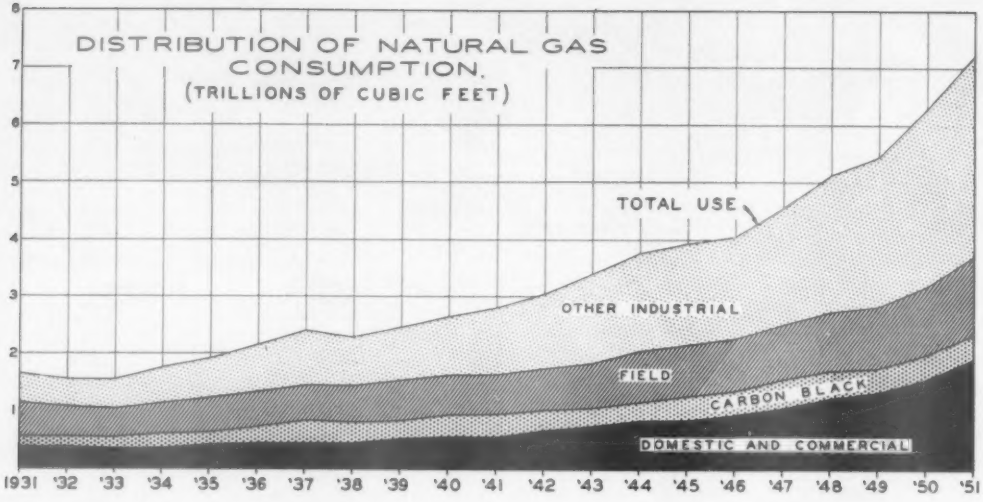
LIGHTER WEIGHT: Only two pieces . . . and no loose rings, bolts or nuts.

WRITE TODAY FOR THE YALE CATALOG

YALE MACHINE WORKS

P. O. BOX 10117 • TELEPHONE MElrose 4282 • HOUSTON, TEXAS

EXPORT: R. S. STOKVIS & SONS CO., NEW YORK, N. Y.


DISTRIBUTION OF NATURAL GAS CONSUMPTION.
(TRILLIONS OF CUBIC FEET)
TOTAL USE
OTHER INDUSTRIAL
FIELD
CARBON BLACK
DOMESTIC AND COMMERCIAL
1931 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50 '51

Gas Sales Nearly Double in Six Years

Volume of natural gas sold in 1951 neared 7½ trillion cubic feet, setting a new record and also representing greatest increase in history.

by John C. Casper
Associate Editor

MARKETED production of natural gas reached 7,415.6 billion cubic feet in 1951, according to the preliminary report of the Bureau of Mines.

The 1951 total was almost twice the volume reported for 1945. Not only did it establish a new record for gas produced in a year but it also represented the greatest increase in natural-gas history.

Since 1947, reports of marketed production by the Bureau of Mines have included exports and transportation losses as well as additions to underground storage near points of consumption.

The 1951 total included 1,471.1 billion cubic feet for residential use, 445.9 billion for commercial, and 5,282.4 billion for industrial. Additions to underground storage during the year amounted to 128.4 billion cubic feet. Exports and transmission losses accounted for 87.8 billion cubic feet.

Almost all of the important expansion in the use of natural gas has come in the past 20 years. The increase in marketed production in 1951 over 1950 was 1.13 trillion cubic feet compared with total production of 1.9 trillion in 1930. More gas was produced in the past 5 years than in all of the years from 1906 through 1934.

Not counting additions to storage, exports, or losses, production of natural gas in 1951 amounted to about 7.2 trillion cubic feet. This is equivalent to about 1.2 billion barrels of crude on an energy basis. Since production of crude and natural-gas liquids totaled 2.45 billion barrels last year, gas sales represented energy equivalent to 50 per cent of total liquid production.

If we consider the fact that gas is not competitive with some of the products made from crude, then gas takes on even more importance. In general, natural gas can replace kerosine, distillate fuel, residual, and L.P.G. Last year's production of these four products was 1,195,265,000 bbl. or equal almost exactly to the crude equivalent of natural gas sold in 1951.

The rate of growth for natural gas sales since 1930 has been larger than the expansion in use of liquid fuels for heating. The gain for the four products that are competitive with gas in the period from 1930 through 1951 was 195 per cent. Residential, commercial, and industrial sales of natural gas increased 271 per cent for the same period.

It has been this same rapid expansion in the use of natural gas in the past few years that has caused some of the fluctuations in liquid-fuel markets.

The total increase in domestic sales of natural gas in 1951 was 1.15 trillion cubic feet or equivalent to about 190 million barrels of crude. Total production of crude and natural-gas liquids increased about 294 million barrels.

Principal of the product-market disruptions were in the Mid-Continent and North Central areas. Most of the product demands for these districts are supplied by refineries within the area. Also, very little of the finished products from these refineries moves to other districts. These conditions result in a very delicate supply and demand balance. If the area has a small excess of products, the effect on the market is very pronounced since high transportation costs prevent the movement of excess material to other markets. If suppliers are forced to find outlets in other market areas for surplus products, the netback at refineries may be below production costs.

Sales of natural gas in the area north of Oklahoma, Arkansas, and Kentucky increased 237 billion cubic feet in 1951, a gain that was equal in energy value to 39.5 million barrels of oil. Sales to industrial accounts, where gas competes directly

with residual fuel, gained 107 billion cubic feet, equivalent to 17.8 million barrels of heavy fuel. Since there was already a slight trend toward excess residual in the area because of the rapid conversion to diesel power by the railroads, the extra gas available for boiler fuel resulted in very soft residual markets.

Unless some plan can be worked out to store all of the excess gas that can be delivered by transmission lines during the summer months, there will continue to be gas available for boiler fuel at low prices during the seasons when residential and commercial demands are low. However, the rapid increase in available supply for the northern states in 1951 made it possible to carry part of the industrial load on into the winter months.

Most refiners believe that a normal growth in residential and commercial installations will reduce the amount of gas available for industrial accounts this year.

For many years natural gas was considered a premium fuel that was used in preference to other materials because it was a clean fuel that met the requirements for thermostatically controlled heating. Today it is competitive for home heating in a major part of the country.

Low Prices at Well

However, the low price of gas to consumers is based on very low relative prices at the well. The average value of gas at the well in 1950 was 6.5 cents a thousand cubic feet and has been estimated at about 6.7 cents for 1951. At this rate, the volume of gas equivalent to a barrel of crude would be worth about 40 cents at the well. The average value of crude at the well is a little more than $2.50 per barrel. The well-head cost of gas represents only 10 per cent of the average cost of gas delivered to a residential consumer. In contrast, the average price paid for gasoline by motorists in 50 representative cities during March of this year was 27.25 cents a gallon including 7.32 cents gasoline tax. Even with the tax, crude prices represent about 22 per cent of the average retail price of gasoline. Between the refiner and consumer, the distribution cost of gasoline is less than half the final price paid by the consumer for the finished product compared with transportation and distribution costs of natural gas amounting to about 90 per cent of the cost to the consumer.

The greatest relative gains in use of natural gas in 1951 were in the northeastern states where the new large-diameter lines from the Southwest furnished the major addition to total gas supply for the area. Consumption in New York, New Jersey, and Pennsylvania jumped 55 per cent in 1951.

The outstanding increases in use of gas in northern and eastern states were made possible by the postwar programs for expanding gas-pipe-line facilities. The importance of gas in the over-all pipe-line program is shown by the fact that two-thirds of all the trunk-line mileage laid in the last 3 years has been for natural gas.

These new and expanded gas-transportation systems have connected the high-demand areas of the North and East with areas of principal reserves in the Southwest.

The East Coast area, including West Virginia, accounted for only 3.9 per cent of gas production in 1951, but this area used 11.6 per cent of the total national supply. These states have only 1.4 per cent of proven gas reserves.

In contrast, the East South Central and West South Central areas shown on the map produced 76.5 per cent of all gas but used only 48.8 per cent. On the West Coast, the influence of the gas line from the Southwest to California is shown by the figures of 7.4 per cent of production and 11.1 per cent of consumption. Gas reserves are 5.1 per cent of total.

The increase of 83.4 per cent in residential use in the 1947-51 period compared with a gain of 57.3 per cent for industrial indicates a trend toward greater relative use by those customers who pay a higher price for the product. However, industrial use still represents more than 73 per cent of total consumption.

MARKETED PRODUCTION OF NATURAL GAS*

(Millions of cubic feet)

	1951	1950	1949	1948	1947	Increase 1947-51 Volume	Increase 1947-51 Per cent
Arkansas	47,600	48,047	47,788	53,946	50,630	— 3,030	— 6.0
California	547,200	558,398	550,903	570,954	560,510	— 13,310	— 2.4
Kansas	407,000	364,024	294,078	245,189	209,321	+ 197,679	+ 94.4
Kentucky	56,400	73,316	51,851	70,095	96,459	— 40,059	— 41.5
Louisiana	1,027,000	831,771	732,845	686,061	581,398	+ 445,602	+ 76.6
Michigan	11,100	11,250	14,753	14,981	18,812	— 7,712	— 41.0
Mississippi	156,000	114,153	68,062	59,800	40,037	+ 115,963	+289.6
Montana	36,600	39,186	35,291	36,551	34,282	+ 2,318	+ 6.8
New Mexico	362,900	212,969	204,961	194,749	142,740	+ 160,160	+112.2
Ohio	37,900	43,163	46,512	65,619	68,946	— 31,046	— 45.0
Oklahoma	583,400	482,360	435,262	480,573	419,010	+ 164,390	+ 39.2
Pennsylvania	99,200	91,137	84,739	87,378	91,971	+ 7,229	+ 7.9
Texas	3,802,400	3,126,402	2,588,921	2,289,923	1,992,704	+1,809,696	+ 90.8
West Virginia	183,300	189,980	181,176	203,681	192,253	— 8,933	— 4.6
Other	117,600	95,964	82,594	88,221	83,120	+ 34,480	+ 41.5
Total U. S.	7,415,600	6,282,060	5,419,736	5,148,020	4,582,173	+2,833,427	+ 61.8

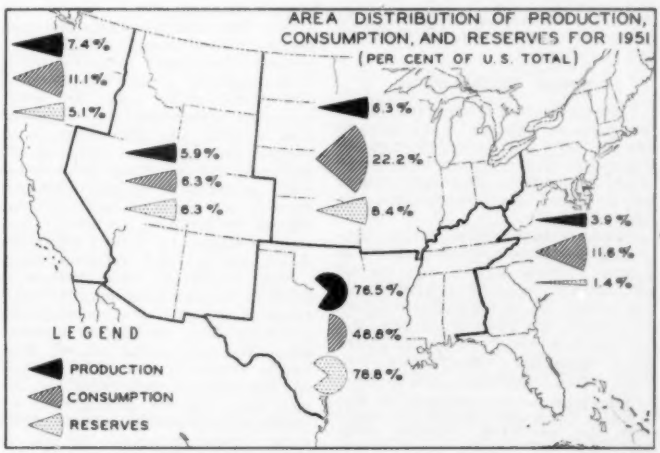
*Includes gas stored and lost in transmission.

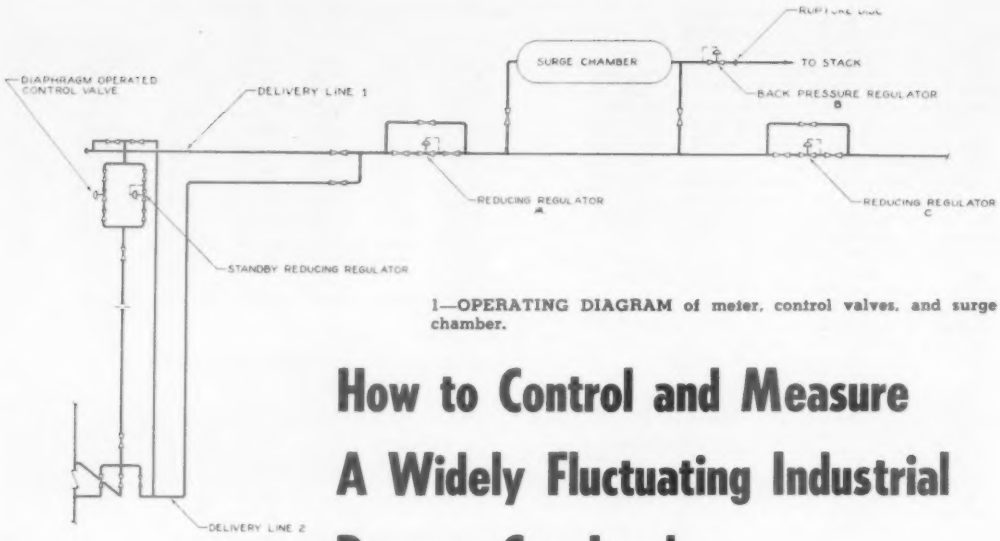
BREAKDOWN OF MARKETED PRODUCTION

(Millions of cubic feet)

	1951*	1950	1949	1948	1947	Increase 1947-51 Volume	Increase 1947-51 Per cent
Sales:							
Residential	1,471,100	1,198,369	992,544	896,348	802,150	+ 668,950	+ 83.4
Commercial	445,900	387,638	347,818	323,054	285,213	+ 160,687	+ 56.3
Industrial	5,282,400	4,467,406	3,875,176	3,744,451	3,357,330	+1,925,070	+ 57.3
Additions to storage	128,400	53,010	65,683	57,371	9,673	+ 118,727	+1,227.4
Exports and loss	87,900	175,437	138,515	126,796	127,807	— 40,007	— 31.3
Total marketed production	7,415,600	6,282,060	5,419,736	5,148,020	4,582,173	+2,833,427	+ 61.8

*Breakdown of sales by Bureau of Mines based on American Gas Association reports.

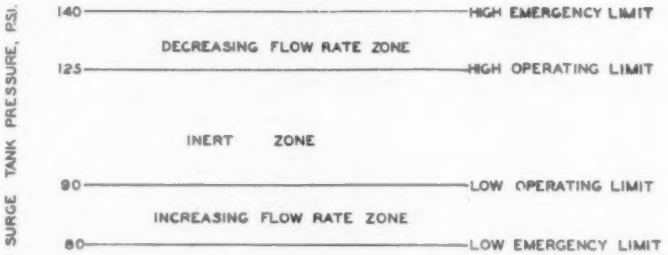




1—**OPERATING DIAGRAM of meter, control valves, and surge chamber.**

How to Control and Measure A Widely Fluctuating Industrial Process Gas Load

by William C. Cameron*



2—**OPERATING BANDS for pressure controller used in controlling gas supply.**

THE industrial process gas load of Coast Counties Gas & Electric Co. is widely fluctuating. The load is of such magnitude that measurement must be by orifice meter. Instantaneous flow rate has varied so widely and so rapidly that flow at other delivery points on the supply system has been affected.

Averaging of the flow data for the purpose of calculating the daily volumes was a difficult, time consuming, and tedious procedure, and the accuracy of both the recorded flow data and the determinations of the average values was open to question.

The characteristics of the load could not be changed; however, in order to improve measurement, the characteristics of delivery to the load had to be improved. For this purpose an installation using instrument control equipment to stabilize delivery rate and a surge chamber to handle the load swing was designed and installed.

Design Considerations

Since orifice meter measurement is required, an attempt was made to smooth out flow by delivering a controlled flow rate into a surge chamber, which chamber would handle plant load fluctuations by pack and draft.

Design considerations thus concerned were flow measurement, surge volume, control valves, and control instruments. Two requirements to be met were: (1) A minimum delivery pressure to the plant of 75 psig. and (2) means whereby personnel in the plant operating room, remote from the control installation, might override the instruments and manually control delivery rate.

The first consideration, that concerning measurement, was simple to resolve. The supply system operates at a relatively constant pressure of approximately 300 psig. An orifice tube and differential gage combination of such size and range as to handle the maximum instantaneous load rate was specified. Since maximum accuracy of measurement was desired, and since installation space offered no problem, the meter runs were designed to exceed maximum A.G.A. and C.N.G.A. specifications.

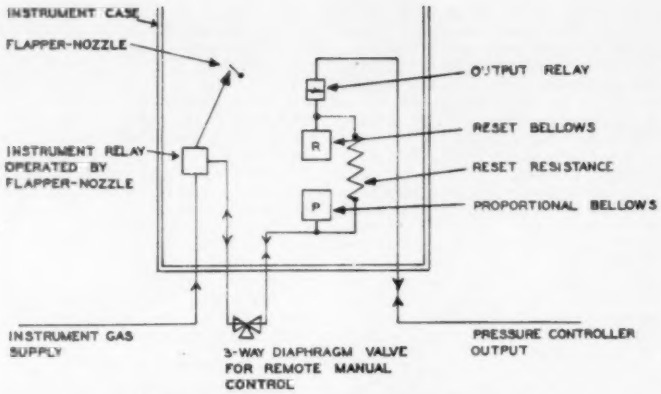
With respect to surge volume, a pressure vessel having approximately required capacity was conveniently available. This vessel had a maximum pressure rating of 147 psig., which limitation was thus imposed on the control installation as the maximum delivery pressure to the vessel. It was decided to afford the vessel further protection by the installation of pressure-limiting equipment operating independently of the instrument control system.

Control-valve specification was a straightforward proposition. Because of the magnitude and importance of the load, it was decided that dual regulation, with each component operating independently of the other, should be provided. Since this was to be primarily an instrument-operated installation, it was necessary that the main valve have such characteristics as to provide adequate control when so operated.

The valve was sized for average delivery rate at maximum delivery pressure. The standby valve was specified to be a reducing regulator, sized to handle maximum load rate at minimum delivery pressure, and required to operate independently of the instrument system.

The determining of instrument requirements provided the most problems during the design stage. The

*Coast Counties Gas & Electric Co. Presented at Transmission Conference, Pacific Coast Gas Association, Berkeley, Calif., April 2 and 3, 1952.



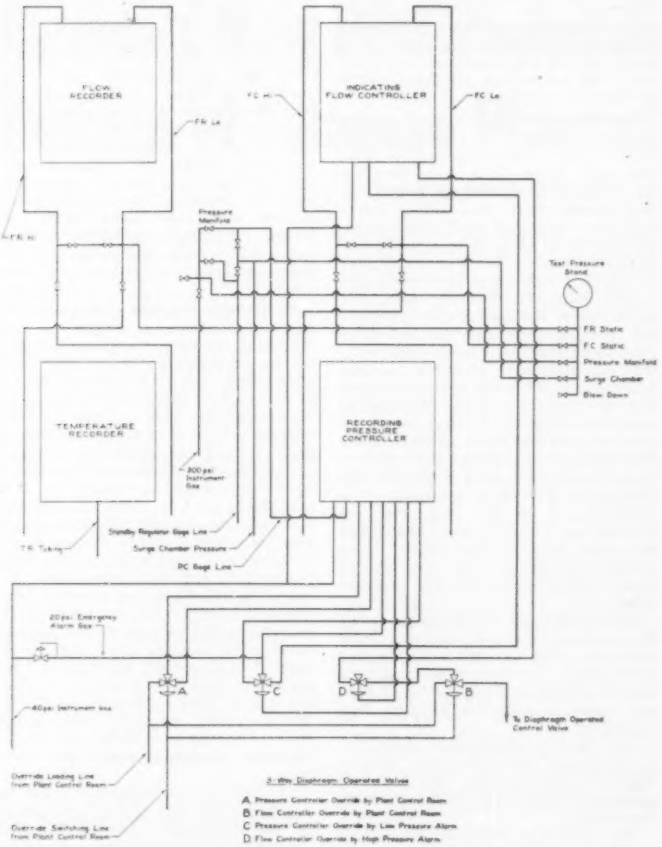
3—INTERNAL CIRCUIT of pressure controller.

ultimate object was flow control, with pressure values being the means by which proper flow rate might be established and maintained. It was necessary, then, that the primary instrument be a pressure controller of the so-called average type; one which would allow the surge chamber pressure to vary between operating limits while holding the flow rate constant, but which would cause corrective action to take place if the pressure drifted out of these limits.

Instrument requirements are illustrated in Fig. 2. With the instrument, or combination of instrument, adjusted to average flow rate, change in flow rate must not occur while the surge chamber pressure is within the operating limits. When the pressure is between either of the pairs of outer limits, the flow rate must be changed to correct the pressure situation. If either of the emergency limits is reached, direct and positive action, involving either full closing or full opening of the valve, must take place.

The pressure controller having been established as the primary instrument and its required operating characteristics having been set forth, attention was next directed to flow control. The pressure controller could have been caused to directly operate the main valve, and pressure averaging would have been accomplished; however, the delivery flow rate would then have been a function of both pressure controller output and pressure drop across the main valve.

Since stabilization of flow was the object of the installation, it was decided to operate the main valve with a flow-control instrument and cause the pressure controller to operate the setting index of the flow controller.



4—INSTRUMENT LINES for tieins between various controllers in instrument system.

Instrument Installation

The meter and valve installation are shown in Fig. 1. All piping components were shop fabricated and erection work in the field consisted of flanging up and making a minimum number of tiein welds. On the high side, the station is tied into the supply system on either side of an existing check valve. On the low side it is tied into two existing delivery lines to the plant. Bypasses and delivery headers are so arranged that any necessary operations of that nature can be performed.

The meter run consists of tubes bored 9 diameters upstream and 4½ diameters downstream fitted with a junior-type orifice fitting, 41 diameters of straight pipe preceding the upstream bored tube, and 15½ diameters of straight pipe extending downstream of the downstream bored tube. Straightening vanes are installed at the upstream end of the upstream run. Flange tap connections to the differential gages are used.

The main control valve is a diaphragm - motor - operated, double-seated, percentage V-port valve, with the motor operated by the flow-controller output. The standby valve is a pilot-operated, expansible tube reducing regulator set to maintain the minimum delivery pressure of 75 psig. This standby regulator operates independently of the instrument sys-

tem. Controlled pressure lines are manifolded in such a manner that it can control either the surge-chamber pressure or the pressure immediately downstream of the regulator header.

The relative location of the surge chamber, with its pressure limiting equipment is shown in Fig. 4. This vessel has a maximum pressure rating of 147 psig. Valve A is a pressure-reducing regulator, set to throttle at 145 psig. This valve normally stands open since the instrument system at the point of delivery is designed to prevent this pressure being exceeded. Valve B is a back-pressure regulator, set at 147 psig., fitted with a rupture disk to prevent leakage, and discharging to a stack. This valve, if it be required to operate, will act in a relieving capacity.

Fig. 4 also shows Valve C, which is the reducing regulator delivering into the plant distribution system. It should be noted that the entire valving arrangement provides maximum operating flexibility. If, for any reason, Valve A need be bypassed and taken out of service, the function and operation of Valve C is not changed. If it be necessary that Valve C be removed from service, the cut to distribution pressure can be made by Valve A by changing its pressure setting. In either of these two events, the instrument-operated main control valve would be taken out of service, delivery would be made by the standby regulator at minimum pressure and the supply flow rate would fluctuate with the load.

Instruments

The flow controller, which operates the main valve, is a standard pneumatic instrument having both proportional and reset action, and a pneumatically operated control index. The index is positioned by the output of the pressure controller, as will be explained later.

The pressure controller is a pneumatic instrument of the averaging type, with proportional and reset action, having both a wide proportional band adjustment and a wide range of reset time adjustment. The flapper-nozzle relationship is a function of both the standard proportional-reset components, and a gap-acting yoke-and-lever assembly. The action of the instrument can best be described by reference to Figs. 2 and 3.

The instrument relay is operated by the flapper-nozzle system. The instrument relay output is fed through a three-way diaphragm valve outside of the case, back into the proportional and reset bellows inside the case, and into a relay on the reset bellows side of the reset resistance. The output of this latter relay constitutes the instrument output, which is delivered into the pneumatic system operating the flow-controller index.

When the surge chamber pressure is within the inert zone, output is a function of the proportional and reset adjustments. Wide proportional band causes instrument inertness. Reset is not a critical adjustment; however, it was believed desirable to provide the action in order that the control point would coincide as closely as possible with the pressure setting index through a range of delivery rates.

When the surge chamber pressure is within either of the changing flow rate zones, the gap acting mechanism either lifts the flapper from the nozzle or moves the flapper to the nozzle, as required, to cause corrective flow action. Since the reset resistence is between the instrument relay and the output relay, the time rate of change of output is a function of reset setting.

If either of the emergency limits is reached, a duplex high and low-limit alarm unit is activated and causes immediate corrective action.

Piping and Auxiliaries

Two sets of differential gage lines come in from the orifice fitting, one for the flow recorder and one for the indicating flow controller. These sets of lines are connected to opposite sides of the fitting in order that measurement for record and measurement for controlling purposes might be entirely separate.

Because of the position of the different gages with respect to the orifice tube, it was necessary to cross the gage lines. This was done on the back of the panel on which the instruments were mounted in order that the crossing of small lines underground might be kept to a minimum. A static pressure line from each gage is run over to the test pressure stand.

The surge-chamber pressure line comes in to the board and branches, one branch tying into the test pressure stand and the other branch tying into the pressure manifold. Instrument gas at 300 psig. also comes into the pressure manifold. Valving is supplied whereby surge-chamber pressure can be fed to either or both the pressure element of the pressure controller and the pilot of the standby regulator. For test purposes, any pressure up to 300 psig. may be established by feed and bleed and the same can be fed to the units mentioned above. This test pressure is also run over to the test pressure stand.

Instrument gas at 40 psig. comes to the board from a small regulator manifold and is delivered to the emergency-alarm-system regulator and to the internal regulators of both the pressure controller and the flow controller.

The 20-psig. emergency alarm gas is delivered into the top port of Valve C, and also into the high-low pressure alarm relay in the pressure controller.

The pressure-controller output is fed through Valve C to the pneumatic bellows which operate the setting index of the flow controller.

The output of the flow controller is fed through Valves D and B to the diaphragm motor of the main control valve.

Valve A is tied in between the pressure-controller instrument relay and proportional bellows. This interconnection is shown more closely in Fig. 3.

As shown in Fig. 4 the diaphragms of Valves A and B are operated from the plant control room. Override pressure from the control room is delivered to a side port of each of these valves.

Valves C and D are operated by the low-alarm side and the high-alarm side of the high-low alarm relay in the pressure controller.

Instrument Operation

The next consideration will be the relationship of all components in the instrument installation, and their operation. For purposes of description, assume the instruments to be in control with the surge-chamber pressure within the inert zone of Fig. 2. The pressure-setting index is at the midpoint of the zone. Proportional band-width setting and reset time constant setting have been made on the basis of successful experience.

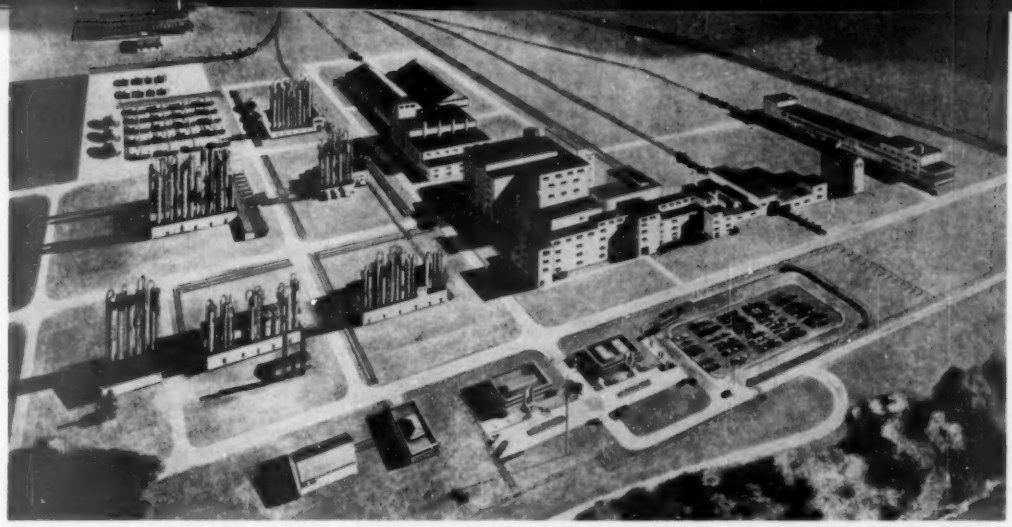
As the instantaneous load rate varies, the surge chamber will be packed or drafted, thus causing the chamber pressure to vary. So long as the pressure varies between the operating limits, the pressure controller output will remain essentially constant because the proportional setting will have been made so. Hence, the flow-controller setting index will remain motionless and the delivery flow rate will remain constant.

If, because of minor changes in the load characteristics, either of the operating limits is reached, the gap action mechanism takes over and causes the pressure controller output to change, thus repositioning flow controller setting index. This in turn causes delivery flow rate to change so as to correct the pressure situation.

The time rate of change of pressure controller output pressure, as was mentioned in the preceding section, is a function of reset resistance (reset time constant) because the reset resistance is located between the flapper-nozzle operated relay and the output relay. When the pressure condition has been corrected back to the inert zone, the gap acting mechanism ceases to function and the basic proportional acting mechanism regains control. The pressure controller output then returns to nearly its former value, the new value being such as to tend to maintain the surge-chamber pressure within the inert zone.

If the low emergency limit is reached, the low-alarm component of the alarm unit reverses the port openings of Valve C, thus dumping 20-psig. gas into the pressure-con-

(Continued on page 161)



BUTANE AND PROPANE and recovered refinery gases will be processed to yield a variety of organic chemicals in this plant of Canadian Chemical Co., Ltd.

Canada's New Petrochemicals Plant Follows Pattern of Celanese Plant at Bishop, Texas

by David R. Kock*

THE new Edmonton, Alta., plant of Canadian Chemical Co. is converting light hydrocarbons to basic organic chemicals, some of which will be used in the manufacture of cellulose acetate fibers. The Edmonton process is similar to that at the Bishop Tex., plant of Celanese Corp. of America, with modifications where necessary.

Feed stock to the plant will be from two sources, liquefied butane and propane from gasoline plants, and recovered gases from Edmonton refineries. Since a sweet feed is required, an H_2S-removal unit is being provided for treating the refinery-gas streams prior to their being fed into the oxidation unit.

The hydrocarbons in the feed are converted to oxygenated chemicals by partial oxidation with air under carefully controlled conditions of temperature, pressure, and reaction composition. After the chemicals have been formed, they are removed from the gas stream for recovery of the individual components.

Products

Products formed in recoverable quantities in the oxidation reaction are: formaldehyde, acetaldehyde, propionaldehyde, acrolein which is the unsaturated form of propionaldehyde, propylene oxide, methanol, acetone, and mixtures of heavier aldehydes, oxides, alcohols, and ketone. Acetals, and a number of other compounds are also formed in trace quantities.

Some of the formaldehyde will be marketed as a 37 per cent formalin solution. The remainder will be reacted with acetaldehyde to make pentaery thritol. The majority of the acetaldehyde will be further oxidized with air to form acetic acid.

Acetic acid production capacity will be sufficient to supply considerable quantities to the Canadian market, as well as to provide the amount needed for cellulose acetate manufacture. Upon being fed to the cellulose acetate plant, acetic acid is first converted to acetic anhydride. Then acetic anhydride is reacted with digested wood pulp to form cellulose acetate.

Propionaldehyde and acrolein will be reacted with pure hydrogen to form normal propanol. A hydrogen unit is being built to supply the necessary hydrogen. From this operation the first tank-car quantities of normal propanol were produced in the United States.

Petrochemical Layout

The petrochemical portion of the plant is laid out in six areas, each approximately the size of a city block with streets completely surrounding each block. This type of layout is being employed to facilitate changes to any of the equipment which might be desired. This action results from experience at Bishop, Tex., in which no more than 40 per cent of the fractionating towers are performing the same service they did in the original plant installation.

The first of the areas will contain the feed-sweetening unit and the hydrogen plant. These two units are housed together because they are both supplied by Girdler Corp., while the remainder of the plant is being built by the Brown & Root organization.

The second of the areas is occupied by the primary oxidation unit. Feed gas is supplied from the Girdler sweetening unit for conversion to oxygenated chemicals. Two chemical streams leave the oxidation unit, one of which is predominantly formaldehyde while the other contains the remainder of the chemicals produced in the primary oxidation. The formaldehyde-containing stream is pumped to a separate area where it is either purified to the 37 per cent formalin solution for sales or converted to pentaerythritol.

The main chemical stream from the oxidation unit is pumped to the products purification unit which is the

*Canadian Chemical Co., Ltd., Edmonton, Alta., Summarization of a paper presented at national conference of the Chemical Engineering Division of the Chemical Institute of Canada, Hamilton Ont., March 1952.

largest unit in the plant, containing about 25 towers and extractors. Straight distillation, azeotropic distillation, extractive distillation, and liquid-liquid extraction are employed in the products-purification unit to make the desired cut between the products of the complex feed mixture. This unit also includes the propylene glycol and hydrogenation equipment. The pure acetaldehyde recovered here is either sold on the market or sent to the acetic acid unit.

Distillation Towers

Approximately 60 distillation towers will be installed in the petrochemical portion of the plant. In the early operation of the Bishop plant considerable difficulty was encountered in the operation of fractionating towers on new compounds. Considerable increases in the capacities of these towers were achieved by rearranging flow patterns and blanking bubble caps.

However some of the calculation methods for predicting performances of bubble trays were open to question. For this reason a 6½-ft.-diameter experimental tray, equipped with an 800-g.p.m. pump and a 16,000-standard-cubic-foot per minute air blower, was installed, and tests were made. The unit was also used to obtain data on the sieve or perforated tray.

Comparison of results showed that the operation of the sieve tray was very superior to that of the bubble tray. As soon as sufficient information was obtained to justify a plant installation, sieve trays were installed in a 6-ft. diameter, 60-tray tower, which was being added to the purification unit at that time.

The first objective of a plant-scale installation was a study of sieve-tray efficiency. Two alcohols with known relative volatilities were selected for the comparison. An idle 2-ft.-diameter bubble-tray column was operated concurrently with the sieve-tray column for the study.

The study revealed two things. First, that the sieve-tray efficiency was approximately 20 per cent above that of the bubble tray and second that the efficiency of the sieve tray did not vary over the experimental range covered as the operating load in the column changed. Unfortunately the boiling range of the test mixture, N-propanol-secondary butanol, was higher than the design liquid and it was impossible to run the sieve-tray column up to maximum capacity due to limitations in reboiler capacity. Bubble-tray efficiencies are low at low throughputs, rise to a maximum, and then fall off again at high throughputs.

After these data were obtained, the 60-sieve tray tower was put in service and has operated satisfactorily for about 2 years now.

Some additional advantages of the sieve-tray column are its simpler construction and consequently lower cost, its easier maintenance, and its higher capacity. Sieve trays should offer about 15 to 20 per cent higher capacity than a bubble tray of the same diameter. The absence of hydraulic gradient on sieve trays is one of the reasons for their greater throughput.

Certain limitations make it necessary to use bubble trays in some cases. These are high-vacuum and distillation applications, under extreme foaming conditions. In order to get good distribution of the vapors through holes in the trays it is necessary that at least 2 in. of liquid pressure drop be maintained on all sieve trays. For this reason its use is limited in vacuum service.

The extreme number of small holes in the sieve tray is the contributing factor to its higher efficiency since the objective in a fractionating tower is to get intimate contact of the vapors and liquids. A 3/16-in.-thick carbon steel plate with 3/16-in. diameter holes is used.

About six sieve-tray columns with diameters up to 8 ft. are in operation at Bishop.

The new Celanese plant at Pampa, Tex., will be predominantly sieve-tray tower and about three-fourths of the towers at Edmonton will ultimately have sieve trays.

Liquid Extraction

It was noted early in operations that low extraction efficiencies were being provided by conventional ring-and-disk trays in liquid-liquid extraction operation. A pilot plant was constructed in which perforated trays were installed inside a glass bell and spigot pipe. Preliminary information obtained on this 2-in. column were used to design a 6-in.-diameter glass column. Data obtained on the larger column were sufficiently encouraging to warrant the installation of the perforated tray in all of the new and most of our existing liquid-liquid extractions. The construction of the tray is as follows:

Downcomers or upcomers, depending upon the direction of the flow of the continuous medium, are installed similar to downcomers in fractionating columns. With the continuous phase flowing down the column, the dispersed phase collects beneath the tray where it is forced up through the holes into the continuous medium at a velocity above the streaming velocity, but at a velocity slow enough to permit individual droplets of uniform size to form as the liquid passes into the continuous phase above. Bypasses are provided for any emulsion which builds up between the phases or in case the flow of the dispersed phase exceeds the capacity of the trays. For a given height extractor about 50 per cent more extraction stages can be installed using the sieve tray as compared to the ring and disk.

Early installations of sieve trays were made by using drilled trays; however, the drilling cost for each succeeding installation was about 50 per cent higher, and it is now the practice to buy mechanically perforated trays. If excessive holes are present in any portion of the tower these holes are blanked off by tack-welding thin strips of the same kind of material over the excess holes. This program permits all sieve trays for a given tower diameter to be perforated to the same pattern and the exact number of holes to be provided by blanking off.

Reboilers

Another improvement included in the plant is the use of thermosiphon reboilers. In the kettle-type reboiler the liquid from the base of the tower flows around the outside of the steam-heated tubes and only the vapor required to supply the demands of the column leaves the reboiler and flows back into the tower.

The thermosiphon reboiler has tubes either 5 ft. or 6-2/3 ft. long, so that three or four tubes can be cut from a standard 20-ft. length of tubing. The steam flows around the outside of the tubes while liquid enters the vertical tubes from the bottom and flows up through the tube. As the liquid flows up the tube a portion of it vaporizes, lowering the density of the liquid inside the tube to such a point that an extremely high velocity results, with the corresponding increase in heat-transfer coefficient. One reboiler of this type operates with an over-all heat-transfer coefficient of 800 B.t.u. per hour per square foot, per degree Fahrenheit.

Except for high-vacuum service an over-all heat-transfer coefficient of 500 is normally used for design purposes, with a maximum heat flux of 50,000 B.t.u. per hour per square foot. To date approximately 10 thermosiphon reboilers have been installed at Bishop plant and are all too big. Since the above design method is not very scientific, a pilot unit has been installed and data are currently being obtained on a variety of products which will permit design of these reboilers on a sounder basis. Even so the square feet required per bundle is only about half of that which would be required in the conventional kettle-type reboiler.

About five or six standard sizes of thermosiphon reboilers have been selected. These are constructed such that either the tube bundle alone or the entire unit is completely interchangeable with most of the other units of similar size in the plant. Spare reboilers which will fit in many places can thus be stocked. With the short length of tubes used in this type of reboiler, it is not necessary to use expansion joints or floating tube sheets to take care of thermal expansion of the unit.

Pumps.—Another feature of the

plant is the standardization of pumps. Excluding special pumps for extremely large quantities or extremely high heads, there are very few different pumps within the plant. For example in the cast-iron and steel line there are no more than six different sizes of pumps and most parts of these are completely interchangeable with each other. While some efficiency is sacrificed by this method of pump selection the investment for spare parts and warehouse space is kept at a minimum. Further, by the purchase of large numbers of pumps of exactly the same description, a considerable price advantage is obtained from the manufacturer.

Instruments. — Standardization of the instrumentation of the plant is being carried out so far as possible and instruments are being purchased on blanket order in the same manner as valves, pipe fittings, etc. Thus any instrument received will be suitable for installation any place in the plant.

Measuring Gas Load

(Continued from page 158)

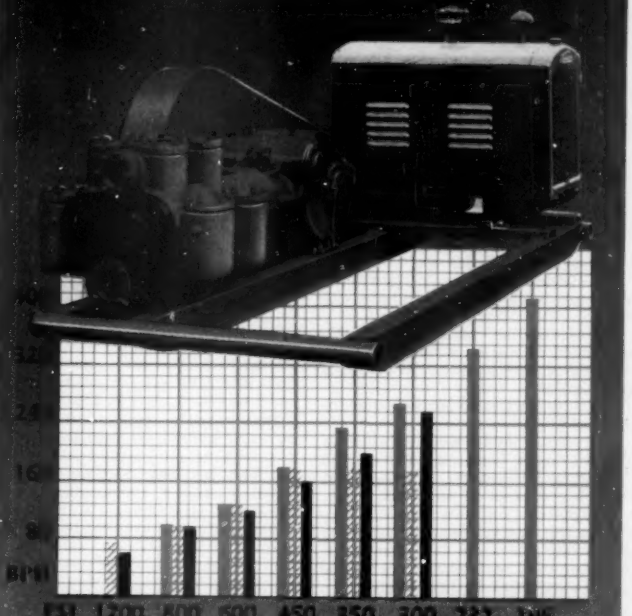
troller output line. This pressure to the setting bellows in the flow controller throws the setting index to a maximum position, which in turn causes the main valve to move toward a full open position. If the high emergency is reached, the high-alarm component reverses the port openings of Valve D, thus venting the output of the flow controller. This causes the main valve to move toward a full closed position.

The overriding of the instruments from the plant control room is accomplished by means of Valves A and B. If the plant operator, located in the plant control room, wishes to control flow rate, he causes the port openings of Valve A to reverse by pressuring up the override switching line. He then feeds controlled pressure into the output relay of the pressure controller, thus positioning the setting index of the flow controller. The proportional and reset bellows of the pressure controller are also positioned by this pressure, so when the plant operator returns the instrument to full control, its output should remain essentially constant.

Valve B will allow the plant operator to override the output of the flow controller and directly position the main valve. If it be necessary to operate the main valve directly, no concern need be paid the instruments and this valving arrangement will work satisfactorily. However, since pressure controller output and flow controller output are not constantly equal to each other, it will be impossible to establish a new flow rate by repositioning the flow-controller index, in the manner described in the preceding paragraph, without upsetting flow rate by directly positioning the main valve.

WHEATLEY'S 6 x 6 PUMP
EQUALS COMPETITOR'S 5 x 10
AND SAVES 30% INVESTMENT

Compare Wheatley's 6" Stroke with Competitor's 10" Stroke
MORE PRODUCTION FOR LESS MONEY


FSI 1200 800 600 450 350 300 232 195
Wheatley 7024-4 x 6 @ 100 rpm Piston Speed = 100 FPM
Wheatley 7036-6 x 6 @ 100 rpm Piston Speed = 100 FPM
Competitors — 5 x 10 @ 54 rpm Piston Speed = 90 FPM

FEATURES

- 3¾" Face Herringbone Gear
- 2300# Weight
- 6.33 sq. in. Valve Area
- Crank Pin 3½" Diameter 3" Base
- 5850 lb. Plunger Load
- Round Valve Covers
- 1⅛" Piston Rod Diameter
- Three Decades of Engineering Design and Experience.

OFFICES

Tulsa, Oklahoma City,
Bartlesville, Oklahoma.
Houston, Odessa, Texas.
Shreveport, Louisiana.

FRANK WHEATLEY
PUMPS & VALVES
TULSA 6, OKLAHOMA

Water Floods That Failed . . .

. . . Case histories on five unsuccessful projects, and speculations as to causes*

A NUMBER of unsuccessful water floods have been reviewed by the Tulsa Section of the Mid-Continent District study committee, in an attempt to learn some of the pitfalls prevalent in these uncertain undertakings.

To this end a brief description of five water-flood projects which have had varying degrees of unsatisfactory results is presented here. This is not intended to be a complete survey of the different causes of water-flood failures, but merely relates some of the more common characteristics of unsuccessful and uneconomical projects.

Some of the more common reasons for unsuccessful floods are:

1. Unfavorable reservoir fluid characteristics, such as high connate water.
2. Unfavorable structural conditions, such as bottom water sand with high water permeability, or channels in limestone.
3. Faulty vertical distribution of input fluid.
4. Miscellaneous causes, such as plugged input wells, insufficient oil saturation, excessive oil viscosity, high clay content of sand, etc.

Information for the five histories used in this analysis was furnished by the various operators. In deference to their requests, projects are not named but are referred to by letter.

*By Tulsa Section, Committee on Secondary Recovery. Prepared by Foley F. Wright, Sinclair Oil & Gas Co., and presented at spring meeting of Mid-Continent District, A.P.I. Division of Production, Wichita.

Project A

This was a water-flood project in a Pennsylvanian sand in the Mid-Continent area. The primary history was normal with a primary recovery of 4,789 bbl. per acre from an estimated 20 to 25 ft. of effective sand. The project was developed by converting alternate producing wells to inputs.

Five of these wells were converted and they in turn influenced seven producing wells. There were no cores taken from within the water-flood pattern but core information obtained from similar wells within 1½ miles of this flood indicated that the connate-water content, by the capillary-pressure method, was approximately 46 per cent and that the permeability of the sand ranged from 20 to 30 md.

Since there were other successful water floods in this general area producing from the same sand, no concern was felt over the ultimate prospects of this project at the beginning.

History.—The flood was initiated by injecting salt water into the five input wells at an average total rate of 300 bbl. per day. Six months after injection started, the producing wells showed a rapid increase in the rate of water production as indicated in Fig. 1.

As a result of this, the produced water volume increased from 1,200 bbl. per month to 10,000 bbl. per month while the oil production increased from 700 bbl. per month to 2,000 bbl. per month. It should be noted that these figures include production from a total of 23 producing wells located on this lease which contained the pilot flood with the 7 affected oil wells.

However, this oil production declined very rapidly and the water-flood project was finally abandoned after an injection of 1,205,000 bbl. of water had produced only an additional 628 bbl. per acre from the flood pattern.

The operator attribues the failure of this project to the high connate-water content which resulted in an increased effective permeability of the sand to water, since the other factors were normal for other nearby, successful floods.

Project B

This was a water-flood projcet in a Texas field producing from a Pennsylvanian lime. The reservoir was a thick section of lime with about 50 ft. consisting of thin productive stringers. The productive area was about 560 acres, the average porosity of the

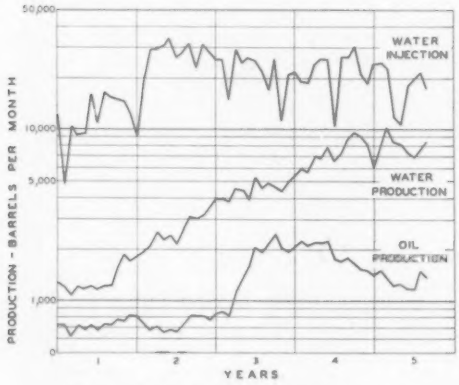


Fig. 1—Project A performance curve.

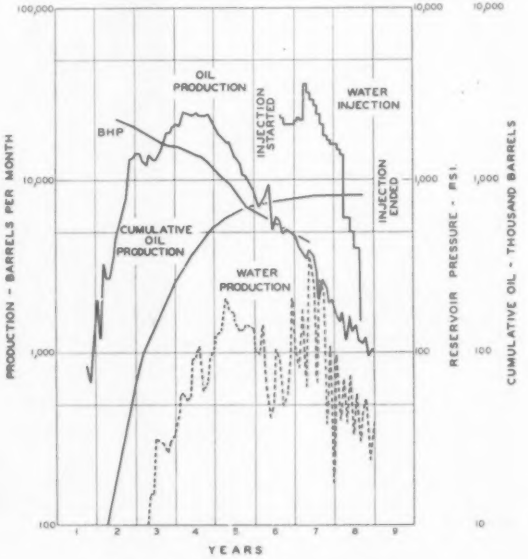


Fig. 2—Project B performance curve.

pay section was approximately 5 per cent and air permeability ranged from 0 to 100 md.

The primary history of this reservoir was normal for the area with a total primary recovery of approximately 1,350 bbl. per acre. There was a limited amount of edge-water encroachment but it was insufficient to affect oil recovery. The producing gas-oil ratio exhibited the usual trend of a solution-gas-drive reservoir. The A.P.I. gravity of the produced oil was 44°.

History. — Three wells were converted to input wells and salt water was injected. Initially all three wells took water readily with injection volumes ranging from 1,200 to 1,800 bbl. per day with no surface pressure.

However, the formation gradually filled up around the injection wells. As the result of this, and possibly due to some plugging effects, the receptivity declined until it was necessary to use pressures up to 200 psi. surface pressure to inject 500 bbl. per day per well. Acidizing, however, helped the injectivity of these wells. The accumulative total volume of water injected was about 460,000 bbl.

The water drive proved ineffectual as an oil-displacement process. Soon after injection started, several of the offsetting producing wells showed increasing water production with small and short term (about 1 month) increases in the oil-production rate. About five producing wells were so affected. The total effect of the water input program is graphically depicted in Fig. 2.

Water injection was abandoned after 2 years when it became necessary to plug back the injection wells to complete a development program in shallower horizons.

Results.—The results of the operation may be summarized as follows:

The increase in oil recovery was noncommercial and erratically distributed among the offset wells.

Channeling of injection water was evident soon after the project was started, suggesting the possibility of fractures or barren, highly permeable zones in the formation.

A considerable decline in injection well receptivity was observed, part of which may have been due to plugging.

The project was not continued long enough to entirely evaluate the flooding possibilities of this lime reservoir, but the available data indicate that the flooding prospects are poor and the project was abandoned.

Project C

This is a water-flood project in a Pennsylvanian sand located in the Mid-Continent area. Its lack of success is unusual because the project is in the immediate vicinity of a number of the very successful water floods. It has been in operation for a number of years and was started by drilling 10 new input wells among 13 old producing wells.

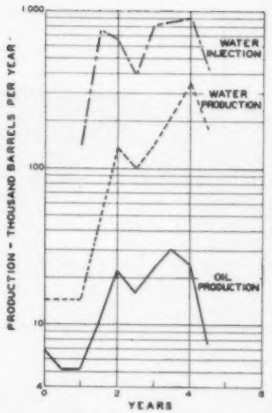


Fig. 3—Project C performance curve.

The primary recovery had been approximately 190 bbl. per acre-foot or about 7,000 bbl. per acre. Core analysis indicated that the average permeability was 79.8 md. and the average porosity 19.8 per cent. The average oil saturation, using a water-base mud and rotary cores, was 16.6 per cent. The average residual-oil saturation was 12.6 per cent. The water saturation of these cores ran 56.7 per cent while the water saturation of a rotary core, cut while circulating oil, averaged 48 per cent on one well. The gravity of the oil averaged 42° A.P.I.

History. — Experience has shown that most input wells in this area, in successful water floods, require surface pressure after about 6 months to inject the desired amount of water. This was not true in this project where water was still going in under vacuum after several years.

Since there is a difference of approximately 70 ft. in the elevation of the sand on the lease, it has been suggested that there may actually be two separate sands into which they have been injecting water.

Another factor is that, in spite of the fact that it is unusual to have bottom water in this area, it is evidently present in this project.

To date, approximately 5 million barrels of water have been injected and 1,155,000 bbl. of water produced. Obviously much of the water has gone off the lease as the amount of water remaining in the formation is enough to fill the voids several times over. The operator has received reports of increased production from wells ½ mile or more from this property and believes that these increases may have resulted from water injected on this project.

The water-flood recovery of this project is about 50 bbl. per acre-foot, having produced around 135,000 bbl. from about 75 acres. The accumulated water-oil ratio for the project is about 37 to 1 whereas comparable ratios for successful projects in this same area have been about 8 to 1. Fig. 3 shows the performance of this project since injection started.

Analysis. — The possible causes of failure are several. Probably the most plausible is that the lower part of the sand is water bearing and most of the water injected has followed this lower formation off of this lease due to its greater effective permeability to water. Plug backs to eliminate the injection of water into the bottom of the sand have not been successful. The operator has tried lowering the injection pressure to reduce the differential pressure on these plugs but to no avail.

Later it was suggested that a very high rate of injection to satisfy the water sand and still provide additional pressure for injection into the oil sand might be successful. This was attempted but only resulted in increasing the rate of oil production in one well.

It was also suggested that the surface of the sand in the producing wells may have become coated with a carbonate deposit which has been noticed on the sucker rods from some wells, or that the upper part of the oil sand may have coated with cement during the cementing of the casing. Because of this acidizing these wells has been attempted, but so far only increased water production has been obtained.

It has also been suggested that the high connate-water values doomed the project from the start.

It is the operator's opinion that the lack of success is due to the channeling or loss of water in the underlying water sand.

Project D

This was a water flood in a Pennsylvania sand in the Mid-Continent area. The project had produced approximately 11,500 bbl. per acre from about 85 ft. of sand during the primary period.

All of the input wells were newly drilled with casing cemented on top of the sand. No new producers were drilled but the old ones were all cleaned out and drilled deeper through the sand. Fresh water was used for injection and surface pressures ranged from 0 to 80 psi. Three of the new input wells were cored and the analyses showed the following information:

Core data—	First well	Second well	Third well
Average porosity per cent	19	20	19
Permeability md. range	90-140	*25-100	30-175
Permeability md. average	80	75	100
Permeability md. range		†500-1,200	
Permeability md. average		850	
Oil saturation per cent range	10-30	15-42	10-37
Oil saturation per cent average	19	32	20

*Top 75 ft. †Bottom 20 ft.

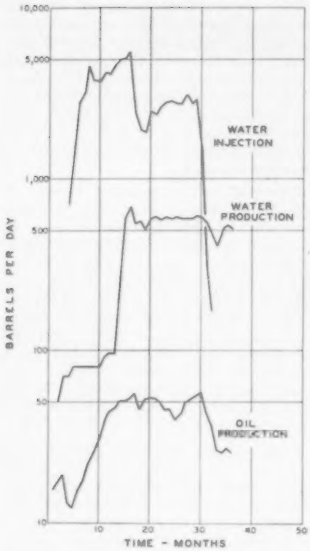


Fig. 4—Project D performance curve.

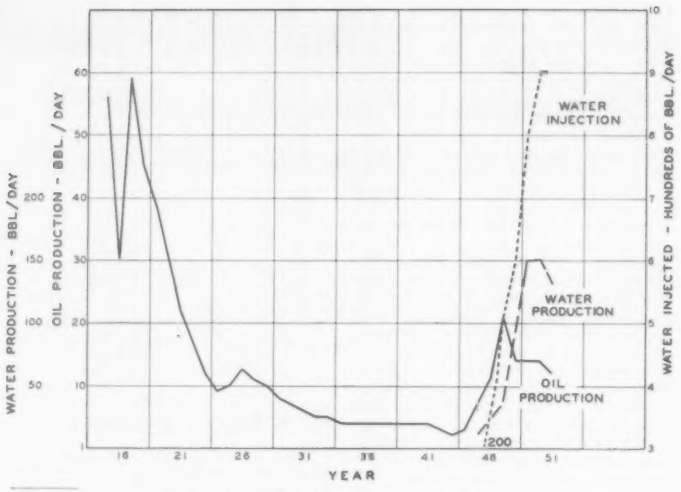


Fig. 5—Project E performance curve.

Fig. 4 gives the performance of this project and illustrates the reaction of the reservoir to the input water.

Results.—It is apparent that insufficient fluids were produced from this property to account for the volume injected during the time covered by this program when 2,500,000 bbl. of water were pumped into the reservoir while 40,000 bbl. of oil and 400,000 barrels of water were produced. The operator calculated the volume of the empty pore space in the pilot area at the beginning of the flood at 435,000 bbl.

It is evident that considerable quantities of this input water migrated off of the lease when it is noted that wells on adjoining leases not cooperating in this injection program increased in their volumes of produced water. Since they did not also experience a similar increase in oil production, the other operators protested vigorously and the injection rate was first severely curtailed and the program was finally abandoned. It was the operator's opinion that the high permeability of this sand to water, especially in the lower productive section, was too great to permit any significant quantity of oil to be displaced.

Project E

This is a water-flood project in a Pennsylvanian sand in the Mid-Continent area. The reservoir is a stratigraphic trap, dipping 225 ft. in a distance of ½ mile. The oil-productive zone was overlain by an original gas zone, and underlain by a nonencroaching water zone containing a 25-ft. oil-water transition zone.

Core analyses indicated an average gross oil-sand thickness of 40 ft., with an effective sand thickness of 20 ft. The average porosity was 22 per cent and the specific permeability to air varied from 0 to 295 md., with an average value of 71 md. Furthermore, the cores showed that the producing zone consisted of badly broken thin sand and shale streaks. These sand streaks were rarely found to be greater than 12 in. thick.

The average oil saturation of both the cable-tool and rotary cores was approximately 40 per cent and a water-flood recovery of approximately 1,000 bbl. per acre was predicted at the beginning of the flood. The gravity of the oil is 40° to 41° A.P.I. and the viscosity is 5.0 cp. at reservoir temperature of 70° F.

The primary recovery on a 40-acre pilot flood was 3,900 bbl. per acre.

At the time the flooding operation was commenced, two new injection wells were drilled, and one old producing well was converted to a water-injection well. One newly drilled injection well and the converted producer were cased on top of the sand while the other newly drilled injection well was cased through the sand and gun perforated opposite the effective sand sections.

The two wells cased on top of the sand took water initially by gravity head alone, at the rate of 10 bbl. per day per foot of effective pay, whereas the injection well cased through the producing zone took 10 bbl. per foot of effective pay at a surface pressure of 200 psi. Fresh water is used for injection and is not treated or filtered. At the present time, an injection pressure of 600 psi. is required.

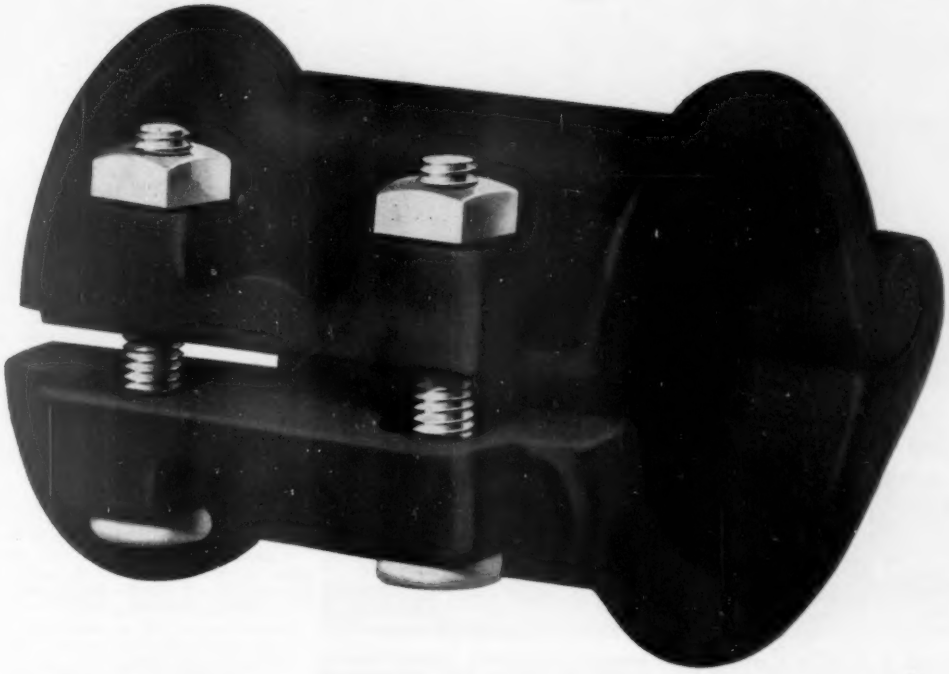
An increase in production was noted only 120 days after injection was started. This increase continued until the lease production reached a maximum of 26 bbl. daily but it then declined rapidly to 14 bbl. per day. This latter rate was maintained for several years, and at this time, 7 years since injection commenced, the rate is 12 bbl. per day.

A gradual increase in produced water has occurred during the last 7 years, and the present water-oil ratio is 12 to 1. To date the water-flood recovery has been 914 bbl. of oil per acre with a ratio of 31 bbl. of water injected for each barrel of secondary oil recovered. Fig. 5 shows the performance of this 40-acre project.

The operator of this project attributes the failure to recover sufficient secondary oil to the broken nature of the thin reservoir sand streaks. In addition, the added expense caused by the drilling of new water input wells, because of the insufficient number of older producing wells available for conversion, also contributed to the loss of money on the project. It is also evident that there has been considerable migration of injection water to adjoining properties.

New Chemicals Boost Secondary Recovery

Two new chemicals made from vegetable and animal fats will soon be pumped underground to obtain larger oil recovery. When a well is nearing the end of its production, water is pumped into the ground to wash more oil out of the sand. Even so, from 25 to 50 per cent of the oil may remain below after the well has been abandoned. The manufacturers claim that when their new chemicals are added in minute quantities to the water larger recoveries will be obtained. Large-scale experiments are to be made shortly in the Southwest.



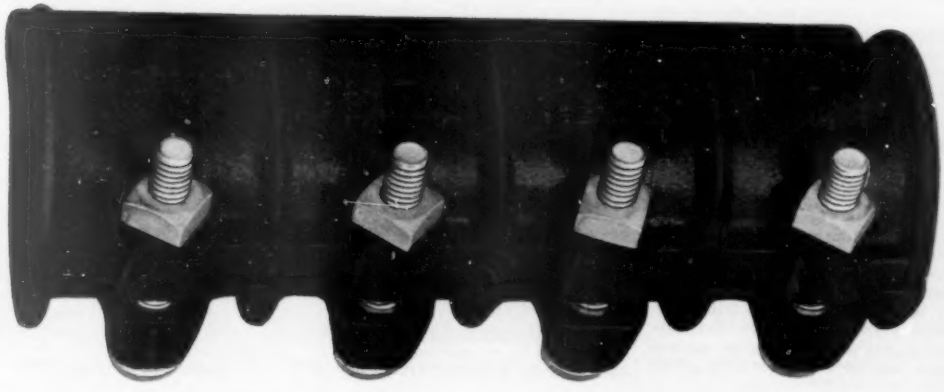
EMERGENCY PIPE CLAMP

SKINNER-SEAL

PIPE LINE CLAMP

During the present critical shortage of pipe, nothing compares with these clamps for repairing corrosion leaks and splits in services as well as mains—for all sizes of steel and cast iron pipe, ½" to 12". These clamps, constantly improved over the years, have been serving the industry for over half a century. In stock, all oil supply stores.

M. B. SKINNER COMPANY
ESTABLISHED 1898
SOUTH BEND 21, INDIANA, U. S. A.



Two rigs at work on a multiple-well island in California's Ventura Avenue field. Ordinary oil-base muds were inadequate due to high temperatures and pressures.

New Oil-Base Emulsion Mud Hailed as Vast Improvement

by John I. Gates* and G. E. Pfenning†

Heavy mud designed for drilling through deep zones is stable at high temperatures, suitable for use at high pressures.

A NEW oil-base emulsion mud which is stable at temperatures up to 250°-275° F., and is reasonably suitable up to mud densities of 125 lb. per cu. ft., or 16.7 lb. per gallon, has been developed by Shell Oil Co.

The improved drilling fluid, called Shell resin soap mud, is designed primarily for use in drilling through the deep (8,000-13,000 ft.) D-6 and D-7 oil zones in Ventura Avenue field of Coastal California. Stability of the mud at lower temperatures and densities has been so good, however, that it has almost entirely displaced ordinary oil-base muds in the drilling of shallower Ventura Avenue oil zones.

*Exploitation engineer Shell Oil Co., Los Angeles, and †mechanical engineer, Shell Oil Co., Ventura, Calif.

Briefly summarized, the problem involved in drilling through the D-6 and D-7 zones was as follows: A mud was required which would form such a thin, soft filter cake that fine mesh (0.012 or 0.015 in.) liners could be set and the wells brought in without the necessity of washing behind the liners. High pressures in these zones made the washing of wells extremely dangerous. The high pressures and temperatures encountered also required the mud be heavy and stable at 250° F. and higher.

Laboratory Development

The first oil-base mud having suitable plastering properties, which was developed by the Shell laboratory in Amsterdam, consisted of oil, blown asphalt, lampblack, and weighting material. It was satisfactory for shallow, low-temperature wells, although the lampblack made the mud messy to handle. In fact, the lampblack was so difficult to remove from skin and clothes that drilling crews had to be paid a bonus to handle it.

When this early mud was used in deeper, hotter wells, high fluid losses were indicated. This was confirmed in Shell's Los Angeles production laboratory, where it was found that at temperatures above 180° F., the plastering properties of the mud progressively deteriorated. Above 250° F., it had poor plastering properties.

During this work, tests showed that the presence of small amounts of water emulsified in the oil-base mud greatly improved its plastering and settling properties at high temperatures. Accordingly, R. D. Dawson, of the Los Angeles production laboratory, initiated a program to develop an oil-base emulsion mud.

Result of this work was laboratory oil-base emulsion mud which had excellent high-temperature properties. In the development it also was found possible to substitute polyvalent metal soaps of tall oil for the obnoxious lampblack. These improved the mud's properties, as well as eliminating one of the main objections to its handling.

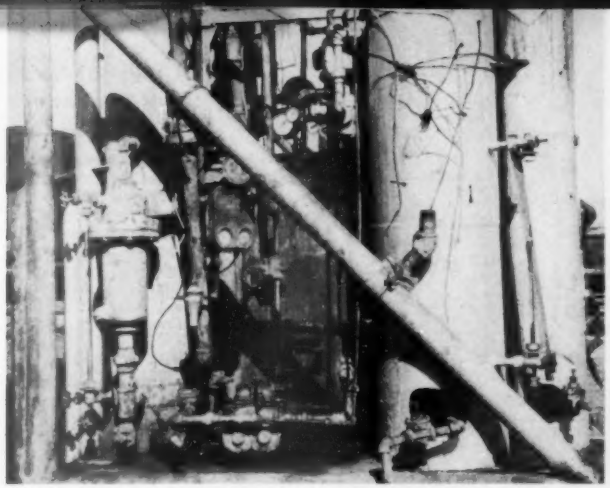
Field trials of this mud, however, were disappointing in that it performed erratically. In some wells the mud would perform satisfactorily. In others it would be suitable for a period of 2 or 3 weeks and then would suddenly become grainy. The weighting material apparently would become waterlogged and settle out, creating an uneven texture in the mud.

During the drilling of one deep well in Ventura Avenue field, a mud with a weight of 115 lb. per cu. ft., or 15.3 lb. per gallon, was being used satisfactorily. Then suddenly alternate slugs of heavy gel and thin mud started coming from the hole. It was found possible to control the mud and complete the well through frequent additions of tall-oil soap. This, however, was expensive and required constant supervision of the mud.

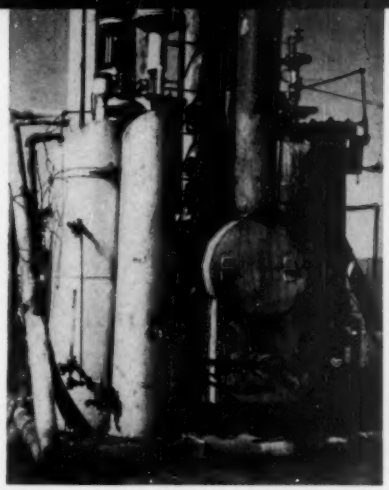
To find the cause and a possible solution for the sudden deterioration of the mud, laboratory work again was undertaken. As sometimes happens in such investigations, the solution was found before the cause. It was not until a satisfactory mud had been developed and in field use that cause of the sudden deterioration was traced to presence of sulfates in the mud.

Prior to this discovery of the cause, a laboratory method for testing the tendency of a mud to deteriorate was developed by J. I. Gates and W. M. Wallis, in Shell's Los Angeles production laboratory. A large number of chemicals were tested under simu-

(Continued on page 168)



Amine solution is circulated through the treater by the gas-powered pump shown in the lower center portion of this photograph of the gas treater. The surge tank is shown at right, with bottom portion of absorber tower at left.



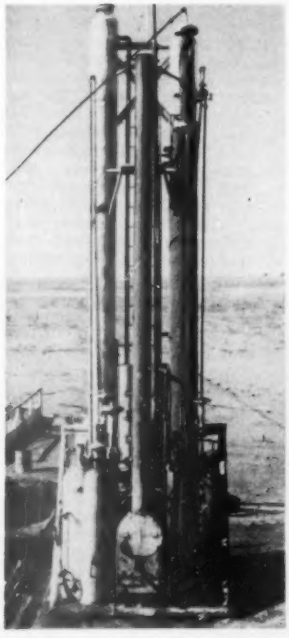
The front portion of the treater shows the burner end of the steam furnace with the surge tank at left with a volume tank, and the water pump at right.

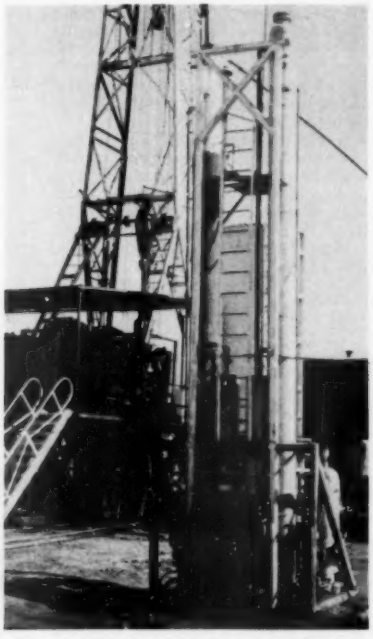
Packaged Treater Sweetens Sour Field Gas for Drilling Engines

by Roy F. Carlson
West Texas District Editor

BY far the most economical drilling-engine fuel from a first-cost standpoint is natural gas obtained from field wells. But, if the field gas is contaminated with hydrogen sulfide to make it acid or sour, it may ultimately prove to be the most expensive because its use will necessitate repairs to the engines. Where H_2S is present in appreciable quantities, fouling of the engine is sure to result, and to happen quickly in the valving and engine cylinders.

Because this sour gas is present in many of the fields in the Permian basin, most operators in this area have resorted to the use of liquefied petroleum gases as engine fuel. However, some operators use diesel engines instead of the gas-burning equipment. Either of these fuels is more expensive than sweet field gas if it is available.





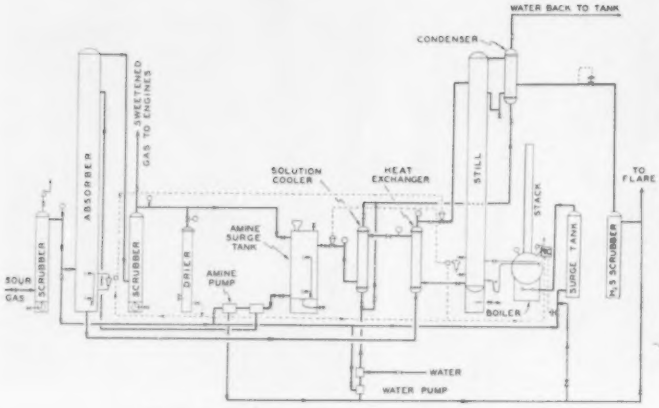
Over-all views of the treater, from front and back respectively.

Packed Sweetening Unit

To sweeten sour field gas and thus make it usable for drilling engines, small packaged gas treaters have been developed to remove the hydrogen sulfide from the gas stream. A treater of this kind employing the well-known amine sweetening process used in many gasoline plants for removing hydrogen sulfide from a sales residue gas stream, is described here.

Sour gas, intended for the drilling engines, is passed through a scrubber, and is then sent through a diethanolamine absorber tower packed with raschig rings. After contacting with the amine solution in the absorber, the sweetened gas is sent through another scrubber and then to the drilling engines.

The hydrogen sulfide-bearing amine solution is removed from the bottom of the absorber tower and is stripped of the sulfide gas in a bubble-plate-equipped tower. Stripping heat is furnished by a small steam boiler mounted integrally with the remainder of the equipment. Water coolers furnish temperature control, taking heat from the stripped amine



Flow diagram of packaged sweetening unit.

solution. A heat exchanger is also used to preheat sour amine solution with some of the hot stripped solution before it enters the top of the stripping tower.

Cooling water is obtained from a large water-storage tank at the drilling site. This tank furnishes all of the radiating surface necessary for cooling the water circulated through the heat-exchange equipment. Both cooling water and amine solution are circulated by gas-powered steam-type reciprocating pumps.

All equipment is mounted on a single skid, so that the treater may be transported as a unit. Long skids, connected at their top by a crosspiece, parallel the two towers of the treater. To move or unload the unit, a winch line is attached to the crosspiece. When in postion on a truck bed the treater is lying on its back so to speak.

All that is necessary to place the treater in operation at a drilling location is to connect water and gas lines, light off the boiler fire which is fed by raw untreated gas, and kick off water and amine circulating pumps. The unit requires very little attention except for occasional additions of amine to the absorbing solution.

Liquid-level and pressure instruments maintain proper outlet submergence in the towers, regulate steam pressure in the boiler, and make the treater virtually automatic in operation. Gas for instruments and motor valves is taken from the purified gas stream, the expended gas being vented.

The gas treater is made available to drilling rigs on a daily rental basis, for all the time it is in use. The treater pictured here has been in nearly constant use by Moran Bros. Drilling Co. for a period of about 6 months. It is manufactured and rented by Portable Gas Treater Co., Odessa, Tex.

New Oil-Base Emulsion Mud

(Continued from page 166)

lated drilling conditions. From the standpoint of cost, availability, and stability it was determined that substitution of magnesium resin soap for the soap of tall oil gave the best solution. Extensive field use of the new oil-base emulsion mud confirmed its stability and reliability.

Resin Mud Properties

The improved Shell mud is the reverse of the usual emulsion mud made by adding oil and chemicals to a water-base mud. For this new mud, water and chemicals are added to the oil base to form a stable emulsion. Water is dispersed in the oil and, therefore, oil is the filtrate of a properly compounded mud. Moderate amounts of extraneous water can be emulsified into the mud without harm, whereas most oil-base muds require chemical treatment to remove or condition extraneous water.

Viscosities of various weights of the new muds are as follows:

Weight lb./cu ft.	Weight lb./gallon	Viscosity Sec.*
65-70	8.7- 9.3	40-55
70-80	9.3-10.7	50-70
80-90	10.7-12.0	65-85
90-100	12.0-13.3	80-95
100-110	13.3-14.7	90-110
110-120	14.7-16.0	110-125
120 plus	16.0 plus	120-140

*Marsh funnel viscosity 1,500 cc. in and 500 cc. out.

Fluid loss of a properly conditioned mud normally is under 0.5 cc. per hour at a temperature of 220° F. and 500 psi., using a filter paper disk 2½-in. in diameter. The filter cake is less than 1/16-in. tnick.

When freshly mixed, a slight top settling exists in heavier muds. This settling increases somewhat with use, and as the water content builds up to 10 per cent or over the settling out of weight material becomes a problem.

However, by keeping the water content below 8-9 per cent by volume and by properly maintaining the heavy muds, they have been run without settling troubles even when viscosities were lower than normal. Under these conditions, muds with the following weights and viscosities have been carried without settling becoming a problem:

Weight lb./cu. ft.	Weight lb./gallon	Viscosity, Sec.*
87-95	11.6-12.7	45-80 (av. 50-60)
103	13.7	66, as low as
112-114	15.0-15.2	90, as low as

*Marsh funnel viscosity 1,500 cc. in and 500 cc. out.

Muds with densities of 120 to 130 lb. per cu. ft., or 16.0-17.3 lb. per gallon, have been run with fair success as long as the water content was maintained under 8 per cent.

If settling problems arise, the usual treatment is to add about 35 bbl. of concentrated soap mix to a volume of 500 to 600 bbl. of oil-base emulsion mud. This consists of ferric stearate, asphalt, and magnesium soap of a wood resin dissolved in stove oil. The quantities of asphalt and stove oil are varied in accordance with the effect desired on the viscosity. This mix, in addition to improving suspension qualities of the mud, also improves its plastering quality.

Ventura Mud Program

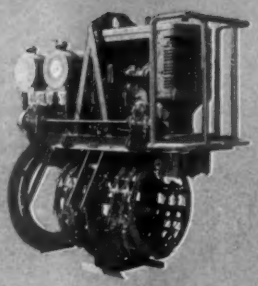
At Ventura Avenue the practice being followed by Shell is to drill from the surface to 700 to 1,000 ft., at which point surface pipe is set, using a Dent mud treated with small amounts of caustic soda, quebracho, and lignite. From there to the top of the producing zone—at some 7,000 to 12,000 ft.—a high-pH lime-emulsion mud is used. This mud is treated with caustic soda, hydrated lime, quebracho, and lignite; oil is added for water-loss control and lubricating purposes. The lime-emulsion mud then is replaced with resin soap mud for drilling through the producing horizon.

In bringing a new well in, if a heavy oil-base mud was used (one of 90 lb. per cu. ft., or 12.0 lb. per gallon, and over), the mud is first displaced by an 80-lb. clay mud with the tubing set above the top of the liner. The clay mud then is displaced with crude oil and the well is allowed to flow. If a light (under 90 lb.) oil-base mud was used, it is displaced directly with crude oil.

As mentioned at the beginning, stability of the mud at lower temperatures and densities has been so good that the improved mud has almost entirely displaced conventional oil-base muds at Shell's Ventura Avenue wells. Patent 2,557,647 was granted to Shell in June 1951 on this mud.

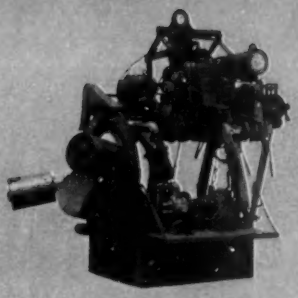
You can depend on Crose for all of your pipeline equipment needs.

- Crose Cutting & Beveling Machines
- Crose Yard Pipe Reconditioning Cleaning and Priming Machines
- Crose Yard Coating and Wrapping Machines
- Crose Internal Lineup Clamps
- Crose Pipeline Enamel Strainers
- Crose Endless Pipe Belt Slings
- Crose Pipeline Cradles
- Crose Portable Electric Generators
- Crose Portable Buffing Unit



CROSE
CLEANING & PRIMING MACHINE

Line traveling, rugged and dependable, equipped with dual multi-speed transmissions providing greater flexibility of control. Interchangeable cleaning and priming assemblies permit each model to process a wide range of pipe sizes. Model M handles 3" - 14" pipe, Model K handles 16" - 26" pipe, Model R handles 30" - 31" pipe.



CROSE
COATING & WRAPPING MACHINE

Spray ring assures positive and uniform coating of pipe, coats high welds, wrinkle bends and egged pipe. Built-in strainer prevents foreign particles from getting to pipe surface. Precision-built paper brakes are adjustable to permit perfect tension of wrapper. Available for all sizes of pipe.

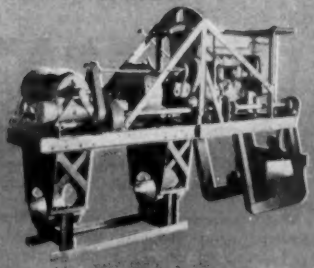
INDISPENSABLE TO BETTER PIPELINING

CROSE-LITTLEFORD
PIPELINE KETTLES

No other kettle can offer so many features . . . fully insulated, perfect circulation of heat. Uniform heating of entire inside tank surface, eliminating hot spots. Agitator is hydraulically operated to keep all filler in suspension with a reciprocating motion. Prevents coking. Unit skid mounted or on Athey tracks. Available in 10, 23, or 30 barrel capacities.

CROSE
AUGER TYPE
ROAD BORING MACHINE

The fastest and most economical method of boring crossings where rock is not encountered. Installs casing as boring progresses—eliminates cave-ins. Absolutely prevents settling of concrete slab highways or railroad beds. Extremely accurate in alignment. Adaptable to all sizes of casing from 3" to 34".



m. j. Crose

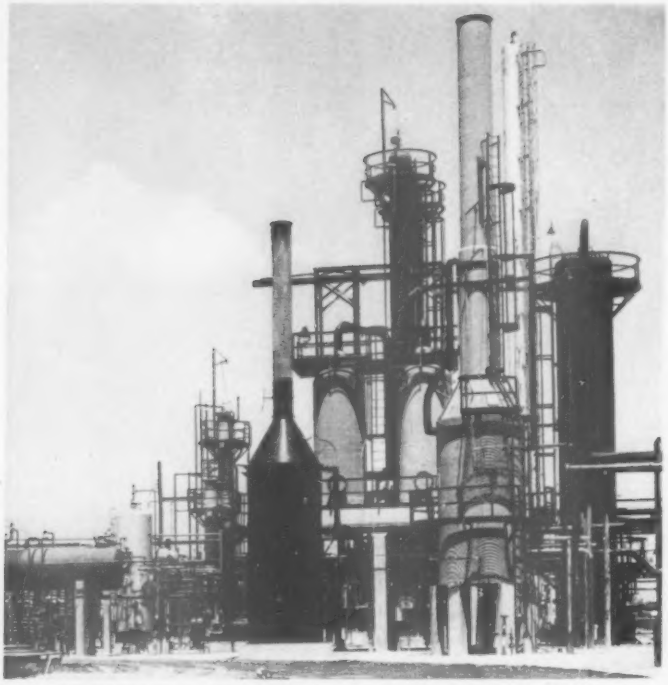
SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY

PHONE 6-2172 TULSA

Manufacturing Company, Inc.

2715 DAWSON ROAD • PHONE 6-2172 • TULSA, OKLAHOMA

BRANCH OFFICES IN HOUSTON, SAN FRANCISCO • EXPORT OFFICE, NEW YORK CITY



MODERNIZATION of Peppers Refining Co. plant at Oklahoma City incorporates this new equipment for upgrading gasoline stocks.

Peppers Adds Cycloversion And Cat Poly Units . . .

. . . *materially improving its marketing position*

by E. M. Beebe*

PEPPERS REFINING CO., of Oklahoma City, has recently completed an expansion program. Prior to this expansion, processing facilities consisted of combination crude topping-thermal cracking and sweetening units.

New equipment installed under the modernization program was considered primarily on the basis of flexibility. In addition to upgrading gasoline stocks, the new equipment was required to process charge stocks varying considerably in their characteristics, to meet seasonal fluctuations in product sales.

The modernization plan was resolved by selecting a Perco Cycloversion unit and a catalytic polymerization unit. Perco Cycloversion was selected because of its flexibility and low operating and construction costs. With this unit, charge stocks can be varied from gasoline-boiling-range material, processed at desulfurization or reforming conditions, to gas oil which can be catalytically cracked.

Each of these operations can be performed in this equipment because the same catalyst is used, the limitation being only the regeneration facilities provided. When operated under reforming conditions Cycloversion permits inclusion of a large front-end portion of the kerosine fraction thus alleviating a problem during the summer months when the market situation for this product is not favorable.

Catalytic polymerization was chosen because the operation complemented the modernization program. The olefin-rich gases made from the Cycloversion operation are thus utilized, along with gases from the thermal cracker, to produce a valuable, high-octane blending component.

The 1,000-bbl. per day Cycloversion unit and the 100-bbl. per day catalytic polymerization unit were designed by Koch Engineering Co., of Wichita, Kans. All construction work was handled by Peppers personnel without interrupting other plant operations. Considerable economy was effected by the utilization of a sizable amount of existing equipment.

Started Operation Last June

The unit, which includes fractionation and stabilization facilities, was placed in operation in June 1951. Straightrun gasoline and cracked naphtha have been processed in blocked operation as well as various mixtures of cracked and straightrun naphthas in combined operation. Cracked and straightrun naphthas are being currently processed in blocked operation. This latter type of operation was employed because better yield-octane relationship is realized when desulfurizing the cracked naphtha and reforming the straightrun naphtha separately and blending the two products to make base stock for both premium and regular-grade gasolines.

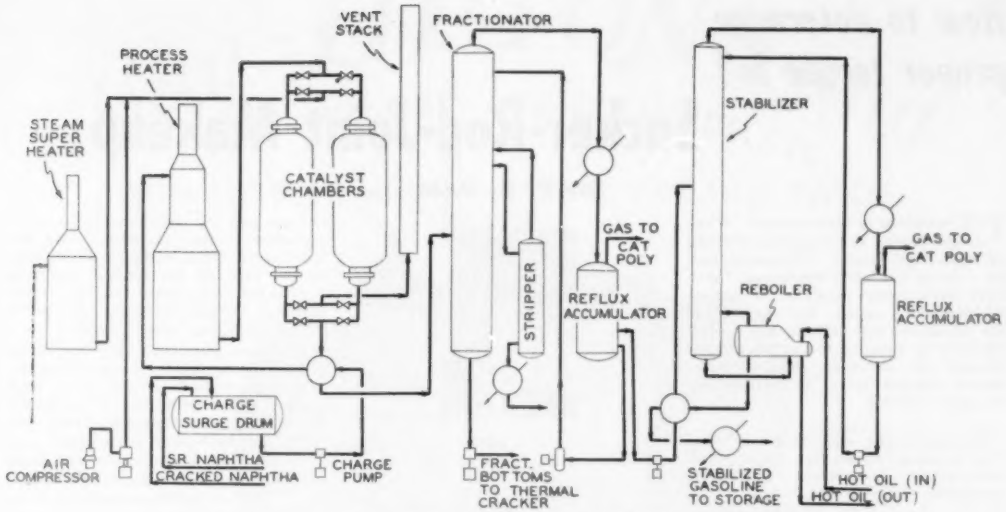
When processing straightrun gasoline, operating conditions are generally somewhat more severe than when processing a cracked gasoline. The reason for this is that a straightrun gasoline charge is usually processed at the reforming level under which conditions two reactions, desulfurization and reforming, are accomplished.

Cracked naphtha is generally processed at less severe conditions which effect desulfurization of the stock. This is because higher temperature levels tend to promote excessive carbon deposition on the catalyst when cracked naphthas are treated. A combined feed of straightrun and cracked naphthas is generally processed at operating conditions intermediate to the reforming or desulfurization operations.

At extreme left of accompanying photograph may be seen the elevated horizontal feed surge tank. This vessel is provided so that straightrun gasoline and cracked naphtha can be run simultaneously into it from the crude-topping and thermal cracking units. The Perco unit charge pump takes suction on this tank. This processing scheme permits charging an essentially oxygen-free stock thereby minimizing low-temperature carbonization of heat exchange equipment.

To the right (Fig. 1) and in back of the surge drum is the fractionator overhead accumulator, which in addition to furnishing reflux to the fractionating column also serves as charge tank for the stabilizer. Just to the right of this accumulator can be seen

*General manager, Peppers Refining Co., Oklahoma City.



Flow scheme of the new Perco unit at Pepper's Oklahoma City plant.

the feed-preparation facilities for the cat poly unit which handles olefinic gases from the Perco unit and the thermal cracker.

In the center foreground of Fig. 1 is the steam superheater which furnishes the diluent for the air used in regeneration of the catalyst. Regeneration temperatures are controlled at the desired level by varying the air-steam ratio. To the right of the superheater is the process heater. Between these heaters may be seen the two reactor chambers with the stabilizer behind them. The reactors are mounted high off the ground with the charge-catalyst chamber effluent exchangers placed under them to effect economy of ground area. The fractionator, not shown in Fig. 1, has a side stripper which takes a cut from the tray located about halfway between the feed tray and the top of the column. This cut is shown as naphtha in the processing results given in Table 1.

Operating data and inspection tests on charge and product when processing straightrun gasoline are given in Table 1. Data are given for reforming this gasoline when operating at three different catalyst-chamber inlet temperatures. Runs 1, 2, and 3 represent mild reforming of straightrun gasoline.

Gas make offers a very convenient means of predicting product octane numbers once a few runs have been made. Obviously, the gas make product-octane number correlation can be made only on a given charge, i.e., when the charge-stock characteristics change it is necessary to establish a new correlation. Gases produced by catalytic reforming are charged to the feed-preparation section of the catalytic polymerization unit. In Run 1 no

(Continued on page 174))

TABLE 1—PERCO CATALYTIC REFORMING OF STRAIGHTRUN GASOLINE

Run—	(1)			(2)				(3)		
Operating conditions—										
Charge, bbl. per day	657			1,084				815		
Cat. inlet temp., °F.	950			960				975		
Cat. chamb. press., psig.	50			63				60		
Gas make, cu. ft. per bbl.	115			118				121		
Recovery—										
Gasoline, vol. per cent of chg.	95.5			70.4				94.2		
Naphtha, vol. per cent of chg.	0			22.6				1.8		
Fract. btms., vol. per cent of chg.	0			1.7				0		
Gas and loss, wt. per cent of chg.	4.5			5.3				4.0		
		—Prod.—			—Prod.—				—Prod.—	
Product inspection—	Chg.	Gaso.	Nap.	Chg.	Gaso.	Nap.	Btms.	Chg.	Gaso.	Nap.
Gravity A.P.I. at 60° F.	62.9	61.7		60.4	64.4	51.5	34.4	64.9	65.0	51.8
R.v.p. at 100° F.	8.4	6.5		5.5	10.7	0		9.3	7.8	0
A.S.T.M. distillation, °F.:										
I.b.p., °F.	115	114		116	95	184	194	94	95	154
10 per cent evaporated	168	160		172	164	272	345	150	143	246
30 per cent	208	208		224	216	310	380	196	190	290
50 per cent	238	236		253	248	335	410	224	223	318
70 per cent	267	266		284	283	354	444	258	252	341
90 per cent	312	322		350	365	380	508	306	295	371
End point	376	378		410	394	428	748	368	340	442
Rec. vol. per cent	99	96		99	95	99	97	99	97	99
Research Octane Nos.:										
Clear	49.8	60.1		46.8	59.5	39.0		53.8	61.0	45.0
+ 1 ml. TEL per gal.	62.6	70.4		58.5	69.0			65.9	71.8	54.2
+ 3 ml. TEL per gal.	74.5	80.2		71.7	79.4			75.8	81.9	68.2

TABLE 2—PERCO CATALYTIC DESULFURIZATION OF CRACKED GASOLINE

Run—	(1)			(2)			(3)		
Operating conditions—									
Charge, bbl. per day	784			818			840		
Cat. inlet temp., °F.	810			855			870		
Cat. chamb. press., psig.	75			55			58		
Gas make, cu. ft. per bbl.	41			50			66		
Recovery—									
Gasoline, vol. per cent of chg.	98.3			75.1			80.7		
Naphtha, vol. per cent of chg.	0			23.0			17.4		
Fractionator btms., vol. per cent of chg.	0.6			0			0		
Gas and loss, wt. per cent of chg.	1.1			1.9			1.9		
	—Prod.—			—Prod.—			—Prod.—		
Product inspection—	Chg.	Gaso.	Btms.	Chg.	Gaso.	Nap.	Chg.	Gaso.	Nap.
Gravity A.P.I. at 60° F.	58.4	58.6	31.4	60.2	62.8	44.5	60.5	64.1	43.0
R.v.p. at 100° F.	5.7	7.4		8.6	8.5			10.3	
A.S.T.M. distillation, °F.:									
I.b.p., °F.	116	98	190	100	87	199	94	95	167
10 per cent evaporated	156	148	311	142	116	208	136	128	278
30 per cent	221	207	366	208	174	338	200	174	330
50 per cent	265	252	417	260	218	358	253	224	353
70 per cent	302	296	475	308	271	360	297	266	374
90 per cent	346	341	690	360	324	350	345	316	408
End point	370	398		396	365	416	380	350	514
Research Octane Nos.:									
Clear	71.0	72.6		71.0	74.6	62.0	73.2	77.0	69.5
+ 1 ml. TEL per gal.	79.1	81.5		79.4	83.6	70.7	81.0	85.6	75.2
+ 3 ml. TEL per gal.	85.6	87.4		85.2	88.3	77.8	85.5	90.4	82.0

How to determine proper torque in Sucker-Rod-Joint Makeup

by D. R. Dale

THE question is often asked: "What is the torque to be used in making up sucker-rod joints?" Obviously, and for reasons hereafter explained, there have been many answers, no two of which exactly agree. The reasons for the variations are entirely due to the variables of manufacturing tolerances, friction of abutting shoulder and thread contact faces, and alignment of joint members.

D. R. DALE
Chief engineer, The S. M. Jones Co.

Properly made up sucker-rod joint. This is one in which the tension load induced into the sucker rod pin by wrenching torque is equal to, or greater than, the maximum pumping load. Also, this induced load should not exceed the yield or elastic strength of the pin. If such a condition is created and maintained, failure by fatigue is impossible, as no change in stress is possible. In making up a joint in this manner, numerous stresses are set up in both the pin and the coupling or box which is known as prestressing.

Field practice. — The makeup of sucker-rod joints varies considerably, depending largely upon the individual rod crews and the manner in which they do the job. While speed of makeup is paramount, cleanliness of joints, care in stabbing and alignment of joint members are of equal importance. Many joints are made up with little and insufficient wrench torque, resulting in early and premature pin failure. Practically speaking, the greater the maximum rod load, the greater the wrenching torque, provided such torque does not exceed the elastic strength of the pin.

Discussion of Joint Makeup

Many joints are made up with little or no prestressing. If, for example, the joint contact faces are set up so as to just contact with each other, no initial stress or resulting strain is set up in either the pin or box. When the pumping load is applied to this type of makeup, the pin will be strained and elongated by an amount proportional to the applied load and the cross-sectional area of the pin, which elongation will open up the shoulder faces.

In passing, it can be stated that practically all of such elongation occurs between the last full thread of the pin and the shoulder face, a comparatively short distance. And for this reason it can be shown that about 40 per cent of the applied pumping load is concentrated at the root of the last full thread of the pin, the point where most pin failures occur.

An open joint not only has little strength and rigidity to withstand the range of applied fatigue stress, but permits the entrance of corrosive fluids and gases, thereby adding corrosive action to that of fatigue.

If a torque is applied to the joint which creates a tension stress or strain in the pin of lesser magnitude than that of the applied pumping load, the following action occurs: The shoulder faces first make contact with each other, after which a tension stress or strain is set up in the pin and a compressive stress or strain set up in the box or coupling counterbore. The tension stress in the pin results in elongation, while the compressive stress or strain shortens the box or coupling counterbore. As the pumping load is added, further elongation of the pin occurs. But as the pin elongates, due to the additional pumping load, the prestressed compressive loading and strain set up in the box is reduced, thereby partially reducing the tension load in the pin.

This elastic action of the box counterbore is often sufficient to maintain contact of the shoulder faces, and in so doing lessen the chance of en-

This Is Good Practice— Is It Yours?

- ☐ Use a wooden trough to tail in new rods?
- ☐ Thoroughly clean and lubricate joints on new or old rods if evidence of dirt, rust, or insufficient lubricant is found?
- ☐ Use either zinc thread compound, heavy grease, or S.A.E. 40 lube oil for joints?
- ☐ Wipe pin and coupling faces clean of dirt and grease so the joint may shoulder?
- ☐ Use a derrick man for stabbing if running doubles or trebles particularly on a windy day?
- ☐ Chase all starting threads damaged by stabbing or cross threading?
- ☐ Use snap wrenches on all joints?
- ☐ Tighten every joint when rerunning doubles or trebles?
- ☐ Before rerunning, reclean all joints on rods laid down in singles?

READING FOR PROFIT JOURNAL CHECK CHART

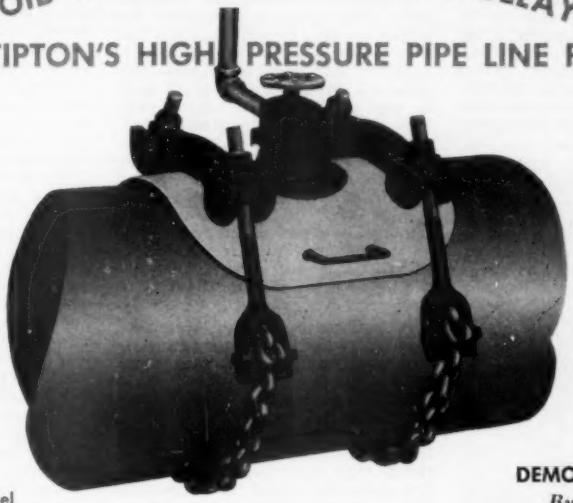
Bad Practice—Making These Mistakes?

- ☐ Removing thread protectors before rod is hanging in the derrick?
- ☐ Using a hammer to remove thread protectors? (This may damage shoulder faces.)
- ☐ Making up a joint by forcing? (Instead, unscrew and check for the cause of the trouble.)
- ☐ Hammering sucker rod couplings to loosen them? (Instead, use a coupling wrench.)
- ☐ Storing or transporting rods with protectors removed? (Keep protectors on!)

Buy TIPTON'S and

AVOID SHUT-OUTS AND COSTLY DELAYS

WITH TIPTON'S HIGH PRESSURE PIPE LINE PATCH



My 40 years' experience with pipe line companies in the field is the reason for the six important factors of the Tipton High Pressure Pipe Line Patch for the safety of the welders.

1. Vent Bonnet with Valve Closing Stem.
2. Vent Plug Valve.
3. Steel Body Patch with Steel Ring. That Encloses Rubber Gasket When Compressed, and Which Gives Protection to Gasket When Welding on Patch.
4. Special Designed Neoprene Rubber Gasket.
5. New Design Chain Clamps.
6. New Design Chain Bolts.

DEPENDABLE SERVICE ALWAYS THROUGH WELL-STOCKED DISTRIBUTORS OF THE TIPTON HIGH PRESSURE PIPE LINE PATCH AND LINE UP CLAMPS
AVAILABLE ONLY THROUGH PIPE LINE EQUIPMENT DEALERS

DEMONSTRATIONS
By TIPTON
CAN BE ARRANGED THROUGH DISTRIBUTORS OR THE GENERAL MANUFACTURING CO.
OKMULGEE, OKLAHOMA

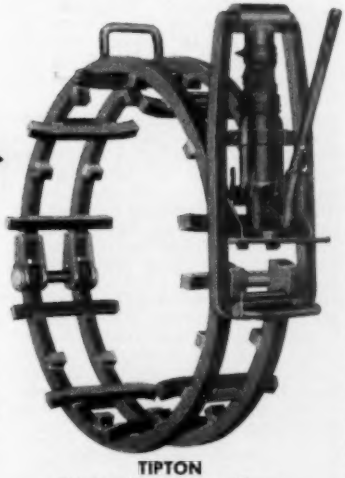
TIPTON
"Standard" Line-up Clamps

For the past 15 years it has been Tipton's for easy, quick and accurate line ups for welding of pipe lines. Simple operation.

Manually operated: Available in 2" to 36" pipe sizes.

Hydraulically operated: Available in 16" to 36" pipe sizes.

PATENTS AND PAT. PENDING
J. J. TIPTON



TIPTON
"Hydraulic" Line-up Clamp

Specify TIPTON'S and

AVOID IMITATIONS

Manufactured by The General Manufacturing Company, Okmulgee, Oklahoma

trance of corrosive gases and fluids into the joint. Such makeup will not, however, reduce the chances of fatigue failure since the pin is still subject to a range of stress.

Fatigue tests have shown that the fatigue strength of a material is dependent primarily upon the range of applied stress. If the range is increased, the fatigue strength is reduced. If the range is reduced, fatigue strength is increased. If the maximum stress is equal to the ultimate strength of the material, there can be no range of stress and failure will occur by tension.

In our first example of joint makeup, the pin is subjected to a range of stress from a minimum of zero load to that of the maximum pumping load. In the second example, the range of stress would be from that of the prestress load to that of the maximum pumping load.

When the joint is tightened with sufficient torque to induce a tension load in the pin equal to or greater than the maximum pumping load, there is practically no range of stress and failure can only occur if the ultimate strength of the pin is exceeded by that of the pumping load.

The most common method of setting up sucker-rod joints is by the use of snap-type sucker-rod wrenches, and less commonly, by the use of power wrenches. A required torque in either inch or foot-pounds cannot be exactly made with the use of snap wrenches, as the torque obtained varies with the strength of the man with the wrench. Uniformity of torque is difficult to maintain because of human fatigue. Power wrenches have an advantage in that a given torque can be applied and maintained.

We have stated that when a tension load is applied to the pin which is equal to or greater than that of the applied pumping load, fatigue failure cannot occur. The difficulty is in applying such a tension in the field and actually determining the magnitude of the applied load. This is no simple problem, as efforts to apply a given tension to the pin are opposed by the erratic forces of friction—friction of the shoulder faces and thread elements. We do not know too well what their values are and exactly how they operate, but we do know that these forces of friction can neutralize as much as 90 per cent of the torque effort.

Distribution of Torque

The torque which is applied to the sucker-rod joint is absorbed in three or more ways. First, there is the frictional resistance of the joint shoulder faces, which increases as the tension in the pin increases and may absorb as much as 50 per cent of the applied torque. Second, there is the friction in the mating thread elements, which may absorb as much as 40 per cent of the applied torque. Third, there is the useful torque equivalent of the tension produced in the pin, amounting to about 10 per cent—a very small amount of the applied torque. It can be seen, therefore, that most of the applied torque is absorbed by varying forms of friction.

Numerous mathematical formulas have been used to determine the torque required to apply a given tension to the pin, but because of the unknown and varying frictional resistances, results vary too much to be of any practical value in the field. It is a well-known fact that pin failures are reduced and many times eliminated by increasing the wrenching torque, even though the exact amount of pin prestress is unknown. A joint which is incapable of maintaining an initial pin tension equal to the pumping load is very likely to fail in severe service; therefore the necessity of checking joint tightness upon every opportunity.

In addition to ranges of tension loading, a large percentage of sucker-rod pins are subjected to bending loads of various magnitudes because of slightly kinked rods, crooked holes, or vibratory motions. The stress changes from repeated bending or vibration are generally of smaller magnitude than those from tension loads, but since they occur simultaneously they must be added to those of the tension loading on the pin. However, these bending stresses will be reduced as the tightness or prestress in the pin is increased.

As stated above, the unknown frictional forces absorb about 90 per cent of the applied torque. The actual coefficient of friction is dependent upon degree of smoothness of shoulder faces, thread flanks, and amount of lubrication of those elements. Design, material, and processing have little effect and are of minor importance. The basic problem is to develop a practical method for determining actual pin prestress and joint tightness, and at the present time the only way in which this can be done is by measuring the elongation of the pin. In the laboratory it is indirectly done by measuring the amount of compression in the coupling or box counterbore. Obviously, such a method is impractical in the field.

Peppers Adds Cycloversion And Cat Poly Units

(Continued from page 171)

side cut was taken nor were any fractionator bottoms made. Runs 2 and 3 show that a side-cut naphtha was taken. This naphtha is used as a blending component in making regular gasoline. The fractionator overhead gasoline is blended with the overhead product from the cracked naphtha operation to make the basic premium gasoline stock. Fractionator bottoms shown in Run 2 are charged to the thermal cracking unit.

Table 2 gives operating data and inspection tests on charge and product when processing cracked gasoline. Data are given for three different temperature levels for operating on this type charge. Again results are shown with and without a naphtha side cut being taken from the Perco fractionator.

The side-cut naphtha is used in the regular gasoline blend. In no case is the yield of product less than 97 per cent based on the charge and, as in the previous operation given in Table 1, the olefins in the off gases are recovered as poly gasoline. Fractionator bottoms, representing not more than 20 bbl. per day, are disposed of as thermal cracker feed. Though no data have been given for processing a wider-boiling-range cut, i.e., one which would contain the lighter portion of the kerosine fraction, such an operation is shown to be economically feasible and doubtless will be utilized during the slow market period for this product.

With the completion of this modernization project Peppers Refining Co. has improved its marketing position with minimum added investment and operating expenses.

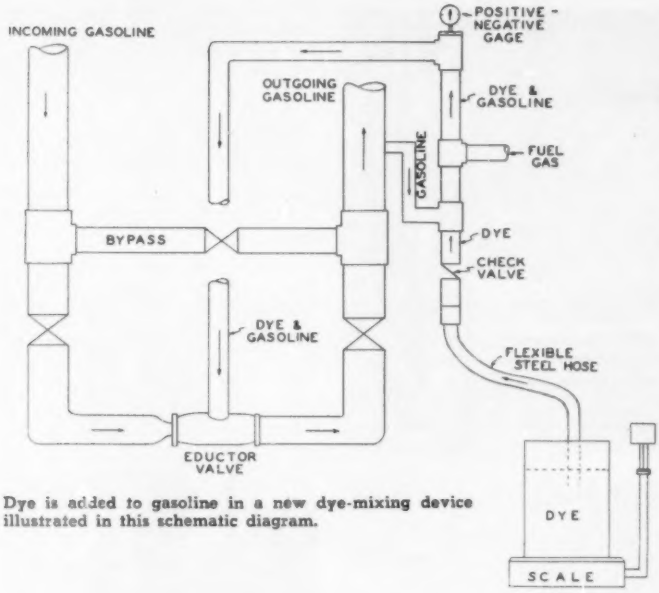
BOOKS

THE SCIENCE OF FLAMES AND FURNACES. By M. W. Thring. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 416 pp. $6.50.

Perhaps the most striking changes in the chain of processes that lead from mineral and organic raw materials to the finished articles in shops are those which occur inside furnaces. All the metals, glass, ceramics, cement, and even the building brick, depend essentially on processes in which the materials are heated through a cycle and either melted or undergo some physical or chemical change at high temperatures. The present book approaches the subject in the hope of assisting to raise the industrial furnace from the status of Cinderella before the arrival of the Fairy Godmother. An attempt is made to present the problems of furnace heating in such a way as to be of interest to the academic scientist as well as to the engineers in charge of the design and operation of furnaces. No mention is made of furnaces other than those heated by flames, thus omitting all types of electrical furnace.

AMERICAN PIPE LINES. By George S. Wolbert, Jr. Published by University of Oklahoma Press, Norman. 179 pp. $3.50.

Presented in two parts, this book opens with a report on the historical, economic, and technical development of pipe lines, including a discussion of the specific issues relating to industry rate and service requirements. The second part surveys existing legal and administrative remedies designed to cope with the problems described in Part 1. The actual influence on rate and service requirements exerted by decisions of the Interstate Commerce Commission and the handling of these matters by the commission are examined thoroughly. Economists, lawyers, legislators, members of the pipe-line industry, and the interested public will find much help in this careful analysis of a most complicated problem.



Dye is added to gasoline in a new dye-mixing device illustrated in this schematic diagram.

How Cities Service Improved Dye Mixing at Lake Charles

Use of suction arrangement eliminates inaccurate dye measurements and improves housekeeping

AN innovation in dye mixing at Cities Service Refining Corp.'s Lake Charles, La., refinery has resulted in a clean dye house, accurate measurement of dye mixed, and elimination of contamination when changing from one color to another.

The common dye pot with its inconvenient handling procedure, an indeterminate circulation period, and poor measuring method have gone by the boards, and with it has gone the unpleasantness usually related to dye houses.

In its place has come a vacuum arrangement whereby dye is sucked into the gasoline stream by the use of pressure drop across an eductor valve. The closest the operator comes to handling the dye is to remove the cover from the drum and insert a length of pipe into the powdered dye. The dye drum rests on a scale, and when the desired weight has been added to the gasoline, the system is shut down.

The suction line is easily cleaned by flushing with a few gallons of gasoline from the tank stream. The gasoline flush is diverted directly to the sewer.

Two separate systems are used by Cities Service, one for handling motor fuel and one for use with aviation gasoline.

Layout. — The piping arrangement consists of a line from storage to the dye house and return, with an appropriate bypass within the dye house. The incoming line is reduced upon its connecting to an eductor valve. The outgoing line is connected to the downstream side of the eductor valve. The resultant pressure drop across the valve creates suction on a line perpendicular to the valve.

The suction line connects to a piping arrangement, at one end of which is a pressure gage for indicating both negative and positive pressure. The piping continues to a tee where a line ties into the fuel-gas system. Just below this, another line ties into the downstream gasoline line. A check valve follows and then the line is connected to a flexible metal hose, attached to a short length of pipe placed in the dye drum.

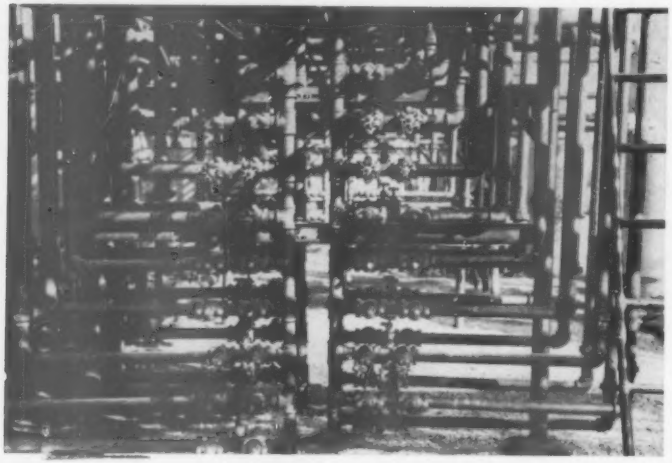
Procedure.—In operating the system, gasoline is circulated through the main lines. The check valve prevents gasoline from the downstream line from leaving through the suction system. When the pressure drop is sufficient—usually 20 psi.—the suction pipe is placed into a dye drum on a scale, and dye is thereby drawn into the system. The dye mixes with gasoline from the downstream line just above the check valve on the suction line. From here the mixture is drawn into the eductor valve and flows through the main line back to storage.

When the scales indicate the proper weight of dye has been added to the gasoline, the operator removes the suction line from the drum and flushes the line with a few gallons of gasoline.

Purpose of the fuel-gas attachment is for use in blowing down the system whenever the line becomes clogged due to atmospheric conditions causing the dye to cake and become lumpy. Either air or fuel gas may be used on the blowdown, but gas is preferred since it may be dried to a greater degree than air.

Fire Hose Container

This hinged "porthole" in the side of a fire house is used by Indiana Farm Bureau Cooperative Association, Inc., at its refinery at Mount Vernon, Ind. Hose is folded, and can be pulled out rapidly when needed.



Valves Put at Convenient Height

IN the refinery of Roosevelt Oil Co. at Mount Pleasant, Mich., a large number of products are manufactured under conditions which require frequent blending in the line.

A manifold was constructed to place the control valves at a convenient working height for the blender or plant operator.

The various lines were led to a common point with risers lowering the piping to the desired position and supplied with unions, ells, and other fittings for attaching to a header which leads to tankage or other processing vessels.

The manifold was constructed in units so that several different types of blends might be made simultaneously.

The position of the control valves provides a situation where men may stand in one position without climbing ladders and stairways to open or shut valves when making blends or mixtures products.

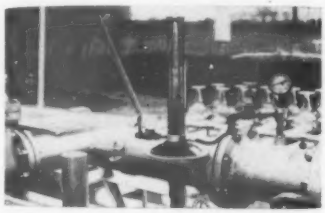
Pressure Hydrometer Jar is Modified by Sunray Pipeline

A pressure hydrometer jar, such as used in determining gravities of propane, butane, or L.P.G., has been modified for determination of petroleum-products gravities, as shown in the photograph. This installation as at the Drumright, Okla., terminal of Sunray Pipeline Co.

The top plate of the pressure hydrometer cylinder was removed and a plastic plate substituted. This plate has a hole cut in it through which the hydrometer can be lowered. The hydrometer cylinder is hooked up to the line. A quick-opening valve on the drain permits rapid filling and emptying.

By placing the glass cylinder on a level plate welded to the line an accurate reading may be obtained without wasting time at frequent intervals looking for a level place on which to set the jar.

Gravities taken in this manner are used to supplement the recording gravitometer which is housed nearby, and are used as a check against possible lag occurring in the chart reading.

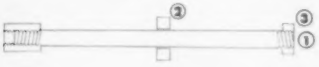


Compressor-Valve Puller Is Field Fabricated

A field-fabricated compressor-valve puller has been devised by Humble Oil & Refining Co. for removing valves easily and safely.

Previously a valve puller furnished by a manufacturer was used to unseat the compressor valve. The puller was removed and the remover shown in the sketch at top was screwed onto the valve bolt to remove the valve from the cylinder.

Under present arrangement the modified puller (1) shown in sketch is screwed onto the valve bolt and the brass cylinder (2) is knocked sharply against the nut (3). The valve can be lifted out with the same tool.



Here's a Tool Board That Is Mounted in Sockets

The conventional tool board commonly used on drilling rigs has an improvement which makes mounting an easy job.

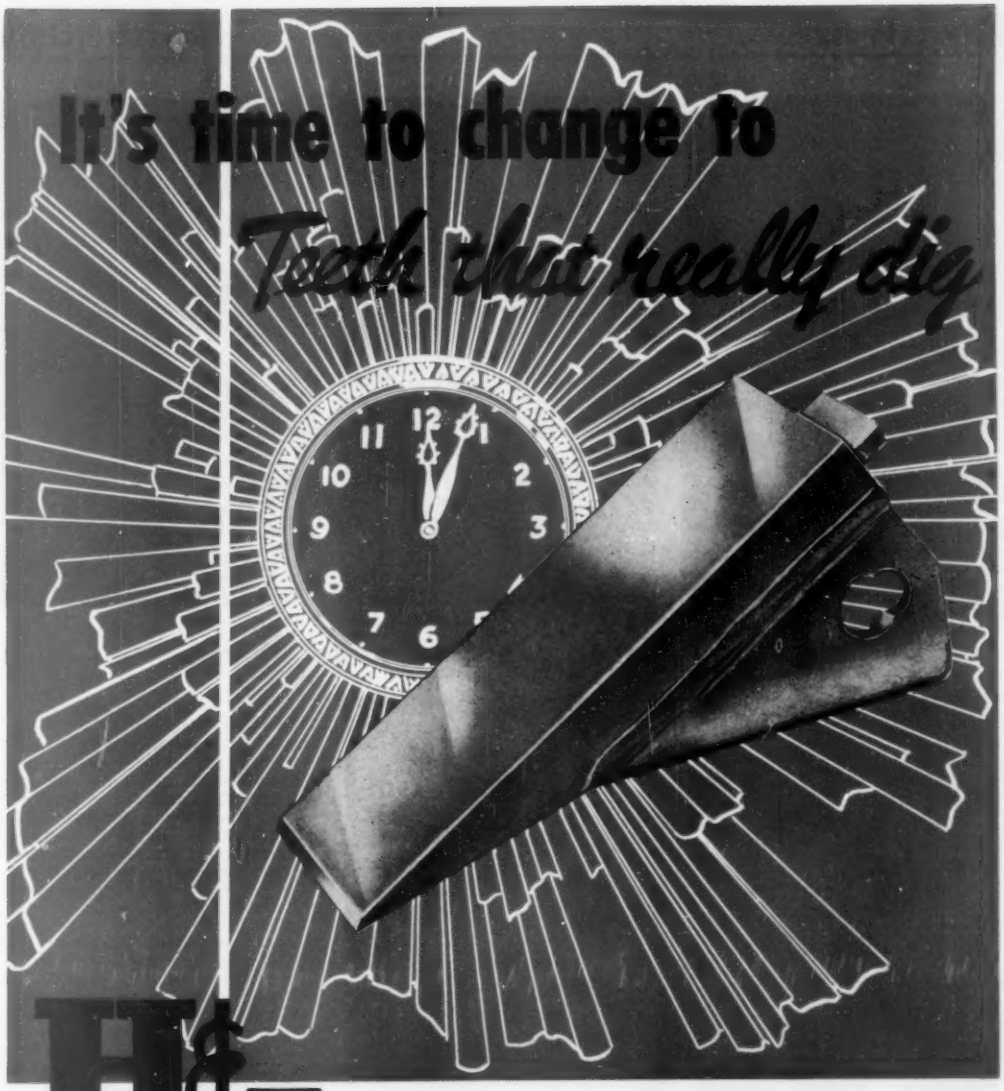
McAteer Drilling Co. uses common 1 by 12's for the face of the board, which is set into a frame constructed of 2-in. pipe.

Each side member extends outward from the board to be placed into ferrules, or sockets, attached to the side of the derrick floor.

A "D" ring at the top provides means of lifting the board with a truck boom for setting and removing. The wood facing was selected, instead of tank steel, so that spikes might be driven into the board for hanging sockets, end wrenches, saws, hatchets.

A clip attached to the back provides a hanger for the crosscut saw.

The tool board can be adopted for various uses at plants and refineries.



H&L TOOTH COMPANY

(Pioneer Manufacturers of Two Part Teeth)

1540 So. Greenwood Avenue Montebello, California

This Derrickman . . . rides to board . . . safely, thanks . . .

. . . to new Phillips safety belt!

THANKS to a new development by the safety division of Phillips Petroleum Co., the derrickman can honestly feel he can travel to and from his perch high above the drilling floor safely without either falling while stepping from the elevators to the board, or being jerked from his position by a "trigger-happy" driller.

This invention is a new-type safety belt, especially for the derrickman.

How it works. — Designed by J. H. Marsee, division rig superintendent for Phillips, and C. G. Starr, safety engineer for Phillips' drilling division, the belt incorporates a special hook which is clamped to the elevator bails. Into this hook one end of a safety tail line is secured. The other end is securely snapped into a harness worn by the derrickman.

It is so designed that it affords constant protection for the derrickman, for he is always attached in some manner. He does not disconnect from this hook on the bails until he is on the board and fastened to another line. But should he forget to unhook from the elevators, the hook is so designed that it will release from the tail line.

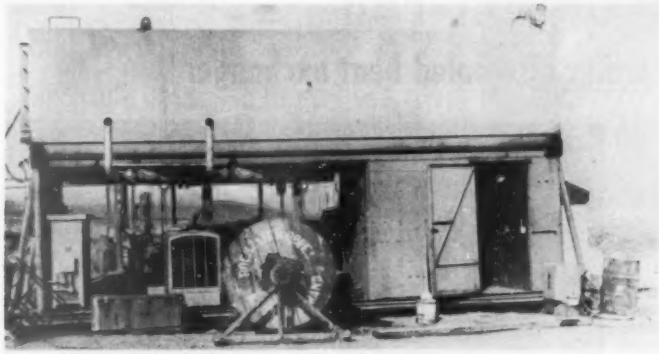
It was this releasing feature that assured the success of the belt (one was previously designed by Starr but proved unsatisfactory for lack of this feature). Previously belts used formerly required that the derrickman be firmly attached in two places pulling against each other (the elevators and the board).

He can't fall.—With development of the releasing-type hook, the derrickman can only be firmly attached in one place at a time, either the elevators or the board, but he has to be securely attached at one place or the other, which prohibits his falling from the time he leaves the floor until he returns to the floor.

Phillips is now completing the installation of these safety belts on all company-owned rigs.

In fact only 9 days after one of belts had been placed in use on one of the rigs, it saved a derrickman's life who had "blacked out" while riding up on the elevators. When he became limp, he dangled from the elevators but the belt held. The driller returned him to the floor safely.

One of the outstanding features of the safety belt, Phillips reports, is that it is easy to use and is not cumbersome or awkward. All of the derrickmen using it heartily endorse it and recommend its use for all rotary-drilling rigs.



Richfield Utilizes Space in Generator Room Effectively

When Richfield Oil Corp. purchased a new drilling rig the possibilities of utilizing space for profitable operation were thoroughly explored.

The generator building is an all-steel structure containing generators and control panel and was built to serve as a support for a large-capacity fuel tank, since the motive power for the entire string of tools is diesel.

One end of this building was partitioned for a separate room, subsequently equipped with bins, shelves, and hangers at one end for supplies and special tools. The other end of the room was equipped with sliding drawers below a steel-faced work bench where the rig mechanic can place small hand tools and parts for necessary small repairs.

A hinged bin was installed at the extreme end of the work bench.

WINDSHIELD.—This handy windshield for pipe-line welders is made of two pieces of plywood on hinges, and no cutting is necessary. This one is being used on a 12-in. natural-gas line from Ringwood to the Enid, Okla., terminal of Oklahoma Natural Gas Co., and was built by Trojan Construction Co.

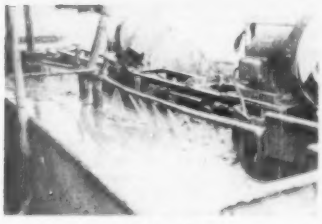


Fig. 1.

Fig. 2.

Changes in Mud System Result in Easier Handling

Revisions of the mud system on a heavy rig operated by Richfield Oil Corp. in North Coles Levee field west of Bakersfield, Calif., have resulted in more efficient handling of the material.

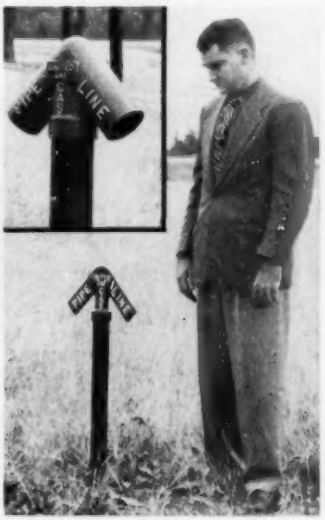
Fig. 1 shows a water spray for adding the required amount of fresh water to the mud at a point where it is most convenient, and where completed dilution will be obtained.

The rig is operated with twin shale shakers, both fed by the same flume. The spray line is attached to hangers and the supply line so that the water will be driven into the mud at the entrance of the shakers. A manually operated valve is set into the supply line at the side of the catwalk where the mud engineer can adjust the amount to the volume required.

Fig. 2 shows a mud gun operating from the high-pressure discharge of the pumps through a split stream, which is directed into the circulation where the mud falls from the flume into the pump suction tank.

The nozzle is set into a line shaped as a goose-neck so the direction of the flow can be changed by turning the line with a pipe wrench.

Force of the split stream of mud, striking the surface, provides sufficient agitation to prevent sedimentation in this end of the tank.



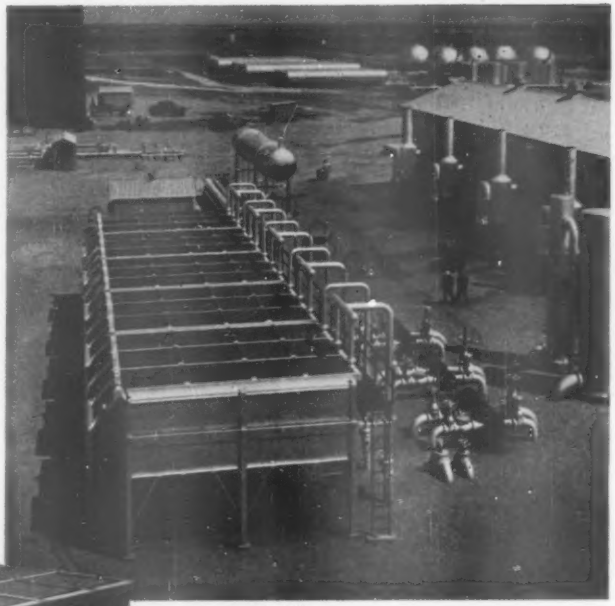
PIPE-LINE IDENTIFICATION comes easy with use of these markers (below) and vents (upper left box). Manufactured by Steel Forgings, Inc., for Fleet-Line Co., the vents and markers will be distributed by N. C. Stearns Co., Shreveport. They conform with all state-law requirements and are made of malleable steel finished in weather-resisting enamels in contrasting colors. Backs are provided with 4 by 2-in. brass plates for stamping location identification. Plates are interchangeable.

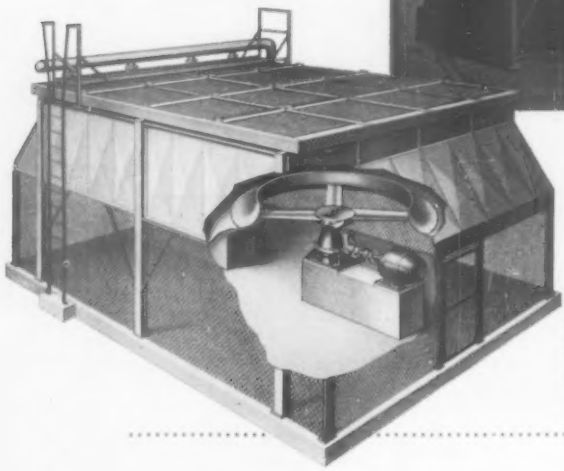
make your own comparison...

a Fluor-GR Fin-Fan

against any other air-cooled heat exchanger

When considering air-cooled heat exchanger equipment, compare the advantages of a Fluor-GR Fin-Fan. Make comparisons of structural simplicity and flexibility. Compare the exclusive features of the Griscom-Russell K-Fin section, the rugged yet precision design of Fluor mechanical equipment. Check *proven performance* in such varied services as gas transmission systems, petroleum refineries, light hydrocarbon processing plants, chemical processing plants, and power and industrial plants. Before you buy or specify, compare the Fluor-GR Fin-Fan. A Fin-Fan provides more exclusive design features —features that add up to *efficient, dependable* performance—than any other make of air-cooled heat exchanger. Write for Fluor Bulletin No. FF-8501.

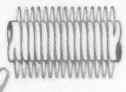




Compare

structural design

Structurally, the Fin-Fan is the ultimate in simplicity and flexibility. Its "truss-type" design provides a rugged, vibrationless unit, free of extraneous parts. Uniform prefabrication of parts, with bolt holes and orientation incorporated in basic design, permits easy extension without shut-down of existing units!



Compare

K-Fin features

G-R K-Fins are tension-wound for moderate temperatures, rolled into grooves for elevated temperatures. Threaded header plugs provide quick, easy access to tube ends for cleaning or replacement. Plugs are shoulder-tight to form a leakproof metal-to-metal joint at all pressures, independent of thread tightness.

Compare

mechanical equipment

Fluor mechanical equipment is ruggedly designed to meet specific heat transfer requirements. 4 basic gear units cover 4 different and distinct horsepower ranges. This, coupled with a choice of fan assemblies ranging from 8' to 20' in diameter, with 4 or 6 blades per fan unit, enables the proper combination of gears and fans to effect optimum efficiency.

Compare

proven performance

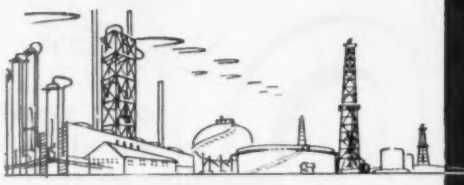
More Fluor-GR Fin-Fan Air-Cooled Heat Exchangers are in service throughout the continental United States and in countries abroad than any other make. More Fluor-GR Fin-Fan installations are the result of repeat orders than any other type. Check with your nearest Fluor Representative for the Fin-Fan's outstanding record of proven performance—in services and duties similar to your own!

FLUOR

Engineers - Constructors - Manufacturers

THE FLUOR CORPORATION, LTD., 2500 S. ATLANTIC BLVD., LOS ANGELES 22, CALIF.
New York, Chicago, Pittsburgh, Boston, Tulsa, Houston, San Francisco, Birmingham and Calgary

Represented in the Sterling areas by:
Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.1., England



THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

No. 6

PUMPS:

Part 6—Pumping Volatile Liquids

by Gerald L. Farrar
Engineering Editor

SINGLE mechanical seals and their application to pumping volatile liquids was discussed in the last installment. The use of double mechanical seals and some operating factors to be considered in the use of mechanical seals are considered in this present section.

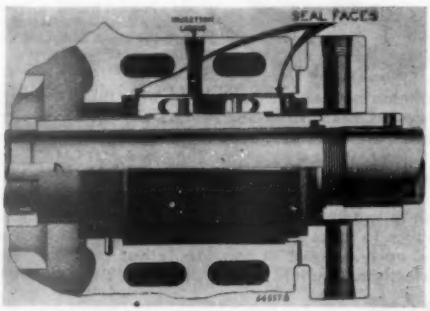
Double Mechanical Seals

The double-mechanical-seal arrangement consists of two seal units inside the packing box and facing in opposite directions (Fig. 1). The packing box is flooded with seal oil maintained at a pressure slightly higher than the pressure inside the pump. The inner seal (nearest the pump) serves as a restraining barrier between liquid inside the pump and the seal oil. If any leaking occurs through this seal, oil thus enters the pump, rather than pumped fluid entering the packing box. The outer seal prevents undue leakage of the seal oil to the outside.

This arrangement is used for corrosive liquids or liquids containing abrasives. In either of these cases it is imperative that the pumped fluid not be allowed to come in contact with the seal faces. Any seal will leak to some extent, and positive measurements must be taken to see that the seal faces are not damaged or pried apart (by abrasives).

The double-mechanical-seal arrangement provides excellent lubrication for the seal faces, and a properly aligned unit may be expected to give long periods of trouble-free operation.

However, detailed attention must be given to the seal-oil system. If the oil pressure is allowed to drop below the pump pressure, even momentarily, the inner seal may open, allowing pumped liquid to enter the stuffing box. Too, there is no assurance that the seal will close when pressure is re-established. In this case a great deal of oil will flood into the pump, and the unit must be shut down for repair and re-alignment.



1—DOUBLE SHAFT-SEAL for corrosive liquids, with red color showing sealing liquid and cross-hatch showing pumped liquid.

Seal Comparisons

The single mechanical seal should be used wherever possible for these reasons:

1. The single seal requires less critical adjustment when assembling the pump.
2. Pumped liquid is not contaminated by seal oil (although this may be of little importance in most cases).
3. The seal and auxiliary assemblies are simpler.
4. First costs are lower.

Seal Operation

Mechanical seals must be put into operation carefully. Long periods of satisfactory operation can hardly be expected if these precision units are abused.

Single seals.—The piping systems on all new installations contain foreign matter which will enter and damage shaft seals. To prevent this, it is recommended that clean liquid under pressure be injected into the seal during the initial starting period and during the first month.

When putting the seal into operation, open the pump suction valve and allow full pressure to build up inside the pump. The rotor should turn easily and little leakage through the seal should result. Otherwise, there may be foreign matter between the seal faces, and this must be removed before starting the driver for normal pump operations.

Double seals.—After assembling the seal, the following steps should be taken:

1. Turn on the seal-oil supply, making sure it is about 10 psi. above the operating pump pressure. Open the pump suction valve. When pump is under full suction pressure, make sure the rotor turns freely and that leakage through the seal does not exceed a few drops, or at most, a very thin stream. If these condition. are satisfactory, the unit may be put into service.
2. If the rotor is extremely hard to turn there may be foreign matter on the seal faces. If this is the case the faces must be inspected and any such foreign matter removed.
3. If the seal leaks more than the prescribed amount, it should be dismantled and realigned. After the first day of operation, the seal should not leak more than 1 or 2 qts. per 24-hour period.

C-S NEW Luxury CONSTELLATIONS

NOTHING FINER! NOTHING FASTER!

FLY C&S direct to

CHICAGO & SOUTHERN AIR LINES

VENEZUELA!

CUBA — JAMAICA

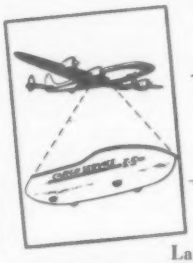
via

NEW ORLEANS GATEWAY

Flights each way Every day!

Fastest daily service from the Southwest! C&S New Luxury Constellations offer 300-m.p.h. pressurized cabin service to the oil fields of Venezuela and South America through the New Orleans gateway. One carrier service from Houston, St. Louis, Chicago and Detroit, with connections at New Orleans to and from New York, Dallas, Tulsa, Los Angeles and San Francisco. For reservations call the nearest C&S ticket office or your Travel Agent.

C&S NEW LUXURY CONSTELLATIONS OFFER FASTEST SERVICE BETWEEN HOUSTON AND CHICAGO; HOUSTON AND DETROIT; NEW ORLEANS AND DETROIT.



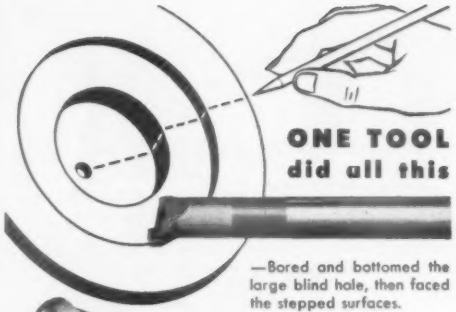
SHIP

C-S SPEEDPAK

Large SPEEDPAK units, carrying as much as most two-engine cargo planes, are attached to the 300-mile-per-hour C&S CONSTELLATION . . . providing a lower deck exclusively for cargo. C&S is the *only* air line operating SPEEDPAK service to Cuba, Jamaica and Venezuela!

CHICAGO & SOUTHERN AIR LINES

Offices in Principal Oil Centers in the United States



ONE TOOL did all this

—Bored and bottomed the large blind hole, then faced the stepped surfaces.

STYLE A for general boring

STYLE B for bottoming and facing

STYLE C for threading

ALL WITH ONE BOKUM BOTTOMING AND FACING TOOL (STYLE B)

Helical back off insures constant clearance and extremely long life of tool, since sharpening is done by grinding face only. Why use TWO tools when the job can all be done with ONE?

You will be *amazed* how easy it is to bore *precision* holes with *Bokum Boring Tools.*

All Bokum tools available in high speed steel (Cat. 1139-6) in Carbide-Tipped (Cat. 398-6) and in Solid carbide (Cat. 948).

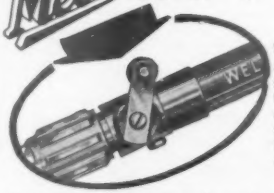
BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

DEPT. G • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

for Mass Production WELDING

there's no torch like the Meco AUTOMAT



The famous MECO "On-Off" Action (above) allows a tiny pilot light to burn at the tip with the action in the "off" position. At a touch it flashes to full production flame. Action tested over 200,000 times without appreciable sign of wear.

For mass production there is no such thing as a good all-round torch. Time and motion studies have proved that for efficient production welding, the torch used must be fitted to its particular job. The Meco AUTOMAT family—embodying the famous MECO "On-Off" action (oval), is perfectly suited to the start and stop welding so common to production. The importance of this time saving feature to mass production work is apparent. Beyond this, each member of this family has built-in features perfectly suiting it to its own particular class of welding.

Meco *Send for further details and New MECO Catalog # 130*

Modern Engineering CO., Inc.

3403 PINE BLVD. ST. LOUIS 3, MO.

by W. L. Nelson
Technical Editor

PROGRESS IN METALS

New Light on Metallizing

THE Metco "Metallizing Handbook," fifth edition, 1951, by Ingham and Shepard, of Metallizing Engineering Co., Inc., Long Island City, N. Y., is probably the most practical description available on the art of spraying metal upon surfaces. It is not profound or scholarly, but those who are interested in theoretical aspects or historical background can refer to "Metal Spraying," by Rollason, Turner, and Budgen, J. B. Lippincott Co., second edition, 1939.

The book is full of practical illustrations, figures, and sketches which indicate clearly the many details of practical metallizing. Many of those who feel that they already know about metallizing have only to turn the pages of the 249-page book to discover many methods and applications of which they were really unaware. Thus, about 74 pages in one section are devoted primarily to surface preparation when metallizing shafts or machine parts including such methods as grit blasting, sand blasting, rough thread, grooving, and roughening with tools, and simpler methods that are possible when employing (spray) wire that has been treated with special bonding agents. Even other methods of surface preparation are described in other parts of the book. This is mentioned mainly to indicate that detailed and specific information is presented.

Many Applications

Metallizing is now conducted in so many various ways and for so many purposes that nothing short of an entire book can touch upon the many applications. Dozens of the more important metals or alloys have been employed, and the many uses and purposes of metallizing are highly diverse. In the oil industry the usefulness of building up worn shafts, spindles, rods, plungers, bearings, keyways, etc., or the coating of flat surfaces, impellers, packing gland bushings, fan blades, tanks, vessels, etc., is obvious. Metallizing is also used widely for the corrosive protection that zinc, aluminum, tin, and lead coatings provide.

The total cost of metallizing cannot be easily stated because of the peculiarities of each job and the different kinds of metals that may be employed, but blast cleaning is a more definite operation and its cost is illustrated by the following example (from the book) on the preparation of a refinery vessel.

A larger refinery vessel is to be coated with 0.015 in. of aluminum. The vessel is 8 ft. in diameter with elliptical ends, and has a 16-in. manhole at each end. The total area to be coated is 1,470 sq. ft. The vessel is new and is in a horizontal position. Ventilation will be provided by installing a blower in the manhole at one end, the other manhole being used for entering and leaving the vessel. Ample air is available and so a ⅜-in. nozzle will be used. A 1,000-lb.-capacity blast machine is available (2,500 lb. of steel grit). Since the abrasive can be easily recovered, steel grit will be used instead of sand. The steel grit will have to be shoveled out the manhole for reloading the blast machine. Because of the manner in which the grit must be handled, it is estimated that the grit loss will be approximately 20 lb. per hour. Since the surface is new and free from scale, it is estimated 25 lb. of grit per square foot will be required.

Total steel grit run through machine: 1,470 × 25 = 36,750 lb.

Hours of actual blast operations: 36,750 ÷ 4,250 = 8.4 hours, say 9.

Grit lost: 9 × 20 = 180 lb.

Grit required: one load (2,500 lb.) plus loss (180 lb.) = 2,680 lb., say 2,700 lb.

Air required: 211 × 9 × 60 = 113,940 cu. ft.

Since the grit must be cleaned up, shoveled out the manhole, and reloaded each time the blast machine is emptied, it is estimated that 1½ hours will be required to reload the machine. The machine will have to be reloaded 36,750 ÷ 2,500 = 14.7 = 15 times, which will require 22½ hours of unproductive labor. A helper will be required at all times.

Steel grit lost: 180 lb. at $160 per ton	$14.40
Labor: 36½ hours (27½ + 9) at $1.60 per hour	58.40
Helper: 36½ hours (27½ + 9) at $1.20 per hour	43.80
Air: 113,940 cu. ft. at 1 cent per 100 cu. ft.	11.39
Total	$127.99

Cost per sq. ft.: $127.99 ÷ 1,470 = 8.7 cents per sq. ft.

Square feet per hour elapsed time on job: 1,470 ÷ 36.5 = 40 sq. ft.

Thus the cost of blast cleaning, under the outlined conditions is 8.7 cents per square foot, which cost includes all labor and materials, but does not include setup time, overhead, or depreciation.

Theory of High-Temperature Scale Resistance

IN the April issue of Metal Progress, Albert M. Portevin summarizes theories regarding high-temperature scale resistance that he has been following for many years. He illustrates primarily by means of oxide film conditions but much the same applies to the sulfide films that are encountered in the oil industry.

"To increase the oxidation resistance of a metal, a solute element must be added which in itself oxidizes more readily than the solvent metal but whose oxide is more refractory than the oxide of the solvent—that is, the oxide must not melt or sublime—and is impervious and adherent." Thus, the physical properties (of the oxide) that pertain to refractoriness, density, plasticity, permeability, etc., must be considered. Among the solute metals that may be used in iron alloys, the metals aluminum, chromium, and silicon produce satisfactory oxides. However, when two or more metals are employed, the ionic or electrolytic conductivity of the scale becomes important because atoms of oxygen or of metal must not diffuse through the oxide scale. Thus, the best protection will be given by oxides that do not form solid solutions or which are pure homopolar compounds. Mixed oxides that form on the surface must be mechanical mixtures, not solid solutions. Portevin also comments that solid solutions of metals act in just the opposite way, that is, high temperatures or solid solutions tend to cause an increase in the ionic or electrolytic conductivities.

"Lightnin Mixers" ARE GUARANTEED TO DO THE JOB *RIGHT!*

LIGHTNIN MIXERS on lube tanks

You're fully covered when you choose a LIGHTNIN MIXER. We guarantee the mixer itself—*and we guarantee that it will do the job for which it is recommended.* Only LIGHTNIN MIXERS give you this double protection.

LIGHTNIN side entering mixers like the one above are made in sizes from 1 to 25 horsepower, for tanks up to 5 million gallons capacity. They are easily repacked from outside the tank, without draining the tank. Choice of four different stuffing boxes, plus wide variety of shaft and propeller materials, assure long service under corrosive, abrasive and other special conditions.

Other LIGHTNIN MIXERS are made in standard sizes as small as 1/42 HP, and as large as 500 HP. For details, check and mail the coupon, or write us describing your needs.

***LIGHTNIN MIXERS* are used for:**

mixing drilling muds and gel
bottom sediment and water control
gasoline blending, ethylizing
lube oil blending, compounding
mixing charging stocks
caustic and doctor treating
feed water treating
asphalt production
preparing specialties
acid and solvent contacting
liming re-run stocks
suspending clay, lime, filter aid

MIXING EQUIPMENT Co., Inc.

174 Mt. Read Blvd., Rochester 11, N. Y.

In Canada: William & J. G. Greey, Ltd., Toronto

Please send me the literature checked:

- ☐ B-76 Side Entering Mixers
- ☐ B-78 Top Entering Mixers (propeller type)
- ☐ B-102 Top Entering Mixers (turbine and paddle types)
- ☐ B-101 Condensed Catalog showing complete line
- ☐ B-75 Portable Mixers (electric and air driven)
- ☐ DH-50 Laboratory Mixers

Name_____

Title_____

Company_____

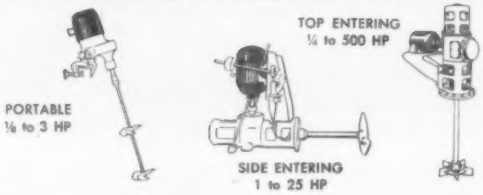
Address_____

City_____ Zone____ State_____

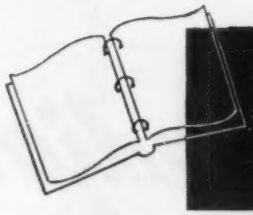
MIXCO

fluid agitation specialists

EVERY *LIGHTNIN* MIXER IS GUARANTEED TO DO THE JOB *RIGHT*



No. 122



REFINER'S NOTEBOOK

How to Save on Discharge Piping . . .

. . . *in closed relief-valve systems*

by S. Chester* and B. W. Jesser†

THREE ways of approaching the problem of relief-valve system design are being covered in this series. The first method, that of using a so-called "back pressure" relief valve, has been discussed and the performance of that type of valve has been covered in some detail. The second method, that of setting the conventional relief valves below vessel design pressure on closed discharge systems, will now be considered.

Maximum permissible back pressure at valve outlet governs the sizing of a closed system collecting vapors released from conventional relief valves. The relief valve operates essentially on the differential between the pressure upstream of the relief valve and the back pressure.

*Piping engineer, and thead of piping analytical section, M. W. Kellogg Co. Portion of paper presented at Toronto meeting of A.S.M.E.

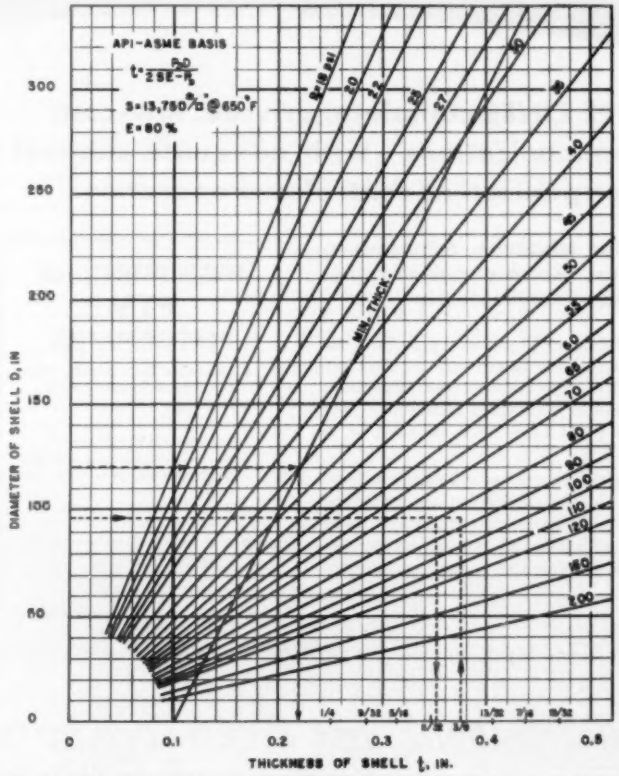


Fig. 1 — Required thickness of cylindrical shells for various internal pressures.

Design codes.—Practically all petroleum vessels are designed according to one of these Unfired Pressure Vessel Codes: (1) 1943 A.P.I.-A.S.M.E., (2) 1949 A.S.M.E., or (3) 1950 A.S.M.E. As these codes are worded, it can be assumed that all refining units designed to the 1950 A.S.M.E. U.P.V. code will probably have "25 per cent discharge systems" (header designed to limit back pressure to approximately 25 per cent of the set pressure of lowest set valve) while those designed to the other two codes will have "10 per cent discharge systems" (pressure accumulation within vessel is held to 10 per cent of design pressure).

For vessels whose design pressures are fairly low and where the quantity to be relieved is quite large, pipe sizes in the closed systems become very large within the above back-pressure limitations.

One way of making a larger back pressure available, with consequent reduction in pipe size and without violating code limitations, is by setting the relief valve below the design pressure of the vessel. The drop available would then be the 10 per cent (or 25 per cent) of the design pressure plus the difference between the set pressure and the design pressure. The set pressure is established, as usual, to secure the right spread between operating and set pressures. The design pressure of the vessel is then increased over and above the set pressure by a given amount. Not only does this increase in design pressure result in substantial savings in the discharge piping, but there is also a saving in relief valve cost since the higher design pressure results in a lower requirement of relieving area.

However, an increase in the design pressure means an increase in the cost of the vessel. It is necessary therefore to compare the increase in the cost of the vessel with the decrease in the cost of the discharge piping and relief valves. Fig. 1 shows a plot of the required corroded thickness of cylindrical shells for various internal pressures. This plot and the cost comparison will be taken up in installments to follow.

for Radio Relay Performance

AT ITS BEST—IT'S

PTM MICROWAVE by Federal

"FIRST Commercial Radio Relay System in North America"

PTM GIVES PIPE LINES complete, private, low-cost, high-reliability communications—with adequate channel capacity for expansion of centralized operation

Federal's system provides for telephone, telemetering, teleprinter, supervisory control, speech-plus-duplex, mobile radio and all other facilities—simultaneously

PROVED-IN . . . by the pipe line industry! That's why pipe lines can rely on Federal Pulse-Time Modulation Microwave . . . the modern system developed by the world-wide International Telephone and Telegraph Corporation, pioneer in microwave techniques. Tens of thousands of channel-miles of PTM have been installed in 15 countries by IT&T associates.

Federal PTM—world's *first* pipe line microwave system—meets *all* communication requirements . . . under *all* weather conditions and over *long* distances . . . without costly line construction and maintenance. PTM features equipment of *highest* RF output and *simplest* design. For complete details, write to Wire and Radio Transmission Systems Division, Dept. D-732.

HIGH POINTS of PTM PERFORMANCE

- Unaffected by fog, rain, snow, ice, static or magnetic storm.
- High signal-to-noise ratio.
- Outstanding for high quality of voice and other transmission.
- No inter-channel crosstalk due to non-linearity of common elements.
- Energy beamed by non-critical, directive parabolic reflectors.
- High power allows large fading margin.
- 99.22% reliability achieved without RF stand-by.

"Federal Microwave—The System Backed by 20 Years of Experience"

FEDERAL TELECOMMUNICATION LABORATORIES, Nutley, N. J., . . . a unit of IT&T's world-wide research and engineering organization.

Federal Telephone and Radio Corporation

100 KINGSLAND ROAD CLIFTON, NEW JERSEY

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N.Y.

FTR — Federal Telephone & Radio — IT&T Associate

Circulation System for Diesel Power Units

CIRCULATION of water through the radiator of unitized diesel power units is accomplished in a novel manner by General Petroleum Corp. with a separately driven centrifugal pump connected into the jacket-water system so that the water is circulated continuously through the radiator regardless of the speed or working conditions of the diesels.

To reduce handling costs as well as the space necessary for installation, General Petroleum has unitized a 7¼ by 18-in., 3,000-psig. working-pressure power-driven pump on a skid base with three diesel power units. One of the power units is a single and the other a twin diesel connected to a transmission.

Conventional equipment radiators have been replaced with a single Young Full-Flow engine jacket-water cooler that is mounted on the end of the skid base of the unit opposite the mud pump. The full rated horsepower of the three engines has been made available to drive the pump by replacing the equipment radiator fans with a single unit operated on the large radiator. This fan is driven separately by an independent electric motor set within the framework of the radiator and connected to the fan with multiple V-belt drive.

Both the pump motor and the fan-drive units are controlled at the point of operation through approved fixtures permanently mounted so all electrician has to do when hooking up power lines is make a simple connection to fixture on the leads passing through conduit integral with the system.

Cooling system. — The cooling system, in addition to the large radiator and individual circulating pumps on the individual motors, includes a surge tank set vertically in the skid-foundation area between the radiator and the motors. The surge tank is made of a 5-ft. joint of 12-in. pipe resting on a flat base bolted to the steel members of the skid foundation.

The electric-motor-driven pump takes suction through a connection attached at approximately the vertical center line of the surge tank and discharges the water directly into the top compartment of the crossflow radiator. Cooled water in turn leaves the radiator through a pipe attached to the base of the surge tank so that water circulation through the surge tank and the radiator is constant.

Circulating pumps.—Each unit of the single and twin diesel-engine power unit uses the regular jacket-water circulating pumps which take suction through individual lines attached to the base of the surge tank and pass the coolant in the normal manner through the jackets. Water flows from the outlet of the jackets through individual piping which discharges directly into the top of the surge tank so that hot water must travel downward to the connection through which the constant-circulation electric-driven centrifugal pump takes suction.

Vapor-lock prevention. — Vapor lock, or steam, in the circulation is prevented from passing into the engine water-jacket pumps by the hot water flowing into the top of the surge tank. Water level is maintained in the system to a height in the surge tank to provide a disengaging section above the water level for steam separation. Any steam generated in the system and not recondensed immediately is permitted to escape to the air through a release line attached to the top head of the surge tank.

A conventional gage glass is attached to the top part of the surge tank so operators may make visual inspection of the quantity in the system. Makeup water is admitted into the surge tank, instead of into the radiator, through a small manually controlled supply line. Normal operation carries the water level two-thirds up in the gage glass which is attached with the bottom fitting, approximately 15 in. above the suction line leading into the constant-circulating pump.

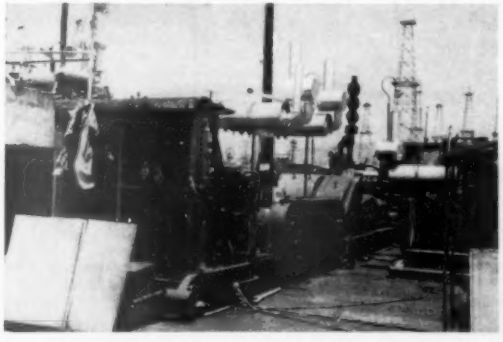


Fig. 1—Mud-pump unit of General Petroleum Corp. equipped for constant water circulation through special radiator hookup.

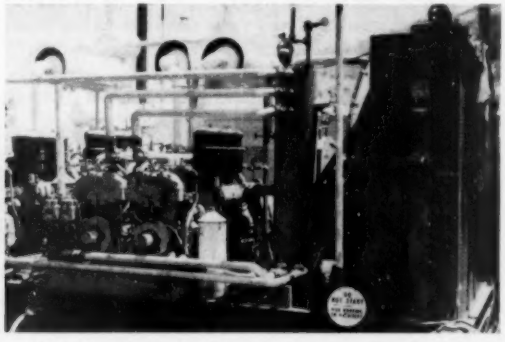
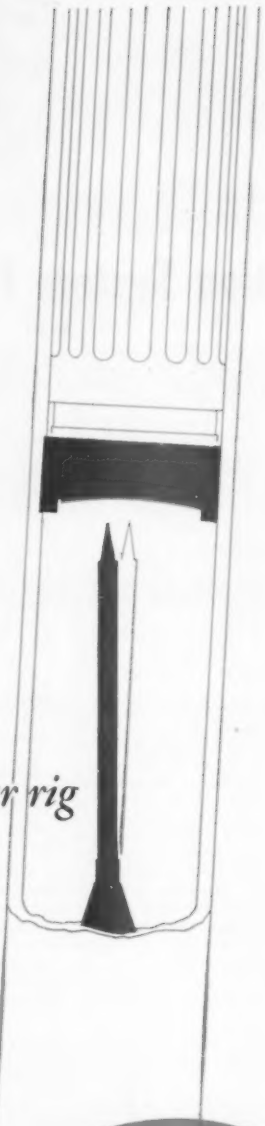


Fig. 2—Suction and discharge lines on constant-volume pump, and motors operating pump and individual-operated fan.

ACCURACY



—another reason for Totco on your rig

In controlled vertical drilling, your success depends on the accuracy of your drift indicator. And you can count on TOTCO —it's accurate!

Just look at TOTCO's chart head . . . you'll notice that the recess in this head is concave . . . that the accurately graduated composition chart sits firmly on this curved bottom, forming itself into a perfect arc absolutely concentric to the arc in which the angle indicator moves. This exclusive TOTCO design, small as it may seem, eliminates errors produced by a chart fixed in a flat position and insures absolutely accurate recordings.

All over the world, operators prefer TOTCO design and construction for sustained and absolute accuracy.

Be **SURE** *you know, use* **TOTCO**

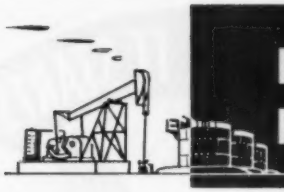
Technical Oil Tool Corp., Ltd.

1057 N. La Brea Ave., Los Angeles 38, Calif.

Exclusive Distributors:

California—The Republic Supply Company of California
Domestic—The Continental Supply Company
Canada—Oil Well Supply Company
Export—Lucey Export Corporation, New York City

TOTCO Recorder



Flow in Conduits—Streamline and Turbulent Flow—Reynolds' Criterion

by Ralph F. Nielsen*

IN applying any of the expressions for Bernoulli's theorem (Engineering Fundamentals No. 480) to the flow of gas or oil in pipe lines it is necessary to know the nature of the friction term F. The nature of this function depends upon the conditions of flow. Because of its importance in all kinds of fluid transmission much engineering research has been done to evaluate the energy losses associated with friction.

When a gas or liquid is flowing slowly in a conduit of small cross-sectional area, say 1 or 2 mm. in diameter, the flow may be "streamline." In the case of a cylindrical conduit, streamline flow means that every particle of fluid moves along the conduit in the general direction of flow. For instance, any particle flowing in the center of the conduit will continue to be in the center as the fluid moves through the conduit. There is therefore essentially no flow away from or toward the center, all particles flowing in the direction of the stream at all times.

Streamline flow in conduits of small cross-section is also viscous flow. If the cross-section is circular and of uniform diameter the fluid flows like a series of concentric cylinders sliding past each other. The velocity is greatest at the center and, at least in the case of liquids, is zero at the walls. The volumetric rate of flow in cubic centimeters per second is given by the well known formula of Poiseuille, which for a liquid (compressibility being neglected) is

$$q = \frac{dP/dl \times \pi D^4}{128\, z} \qquad (1)$$

where

dP/dl = the pressure gradient in dynes/cm.²

D = tube diameter in cm.

z = viscosity in poises

Since the velocity is constant along the tube, the pressure gradient is entirely due to internal or viscous friction.

Under average conditions of fluid transmission in pipes the flow is not streamline but "turbulent." That is, while the net motion is along the pipe, there is also continuous motion from the center outward and vice versa. Any particular particle, therefore, moves in a crooked path.

It has been found that for a particular shape of conduit, such as a long cylinder or pipe, conditions for streamline flow and those for turbulent flow can be rather sharply defined. The criterion, sometimes called Reynolds' criterion, is based on a value known as the Reynolds number. This is defined as Dus/z, where D is the pipe diameter, u the net linear velocity along the conduit, s the density, and z the viscosity. This quantity is dimensionless and will have the same numerical value in English units as in cgs. units. In English units D is in feet, u in feet per second, s in pounds per cubic foot, and z in pounds per foot-second.

Numerous experiments have demonstrated that for smooth round pipe or tubing the flow will be streamline when the Reynolds number is less than about 1,500 and turbulent when the value is higher than this. One may thus readily calculate whether flow is streamline or turbulent from the size of pipe, the rate of flow, and the viscosity and density of the fluid. When the flow is streamline Poiseuille's law holds. When it is turbulent the law no longer holds. This is shown in Fig. 1, in which the "friction factor," defined later, is plotted against the Reynolds number. For the streamline flow, the friction factor is a constant times the reciprocal of the Reynolds number. This is shown by the 45° line on the logarithmic plot.

As mentioned before, the flow of gas or oil in a pipe line is in general turbulent. While Poiseuille's formula for viscous streamline flow can be derived from simple physical concepts, the motion of the fluid in turbulent flow cannot be expressed in a manner that lends itself to similar fundamental mathematical analysis. The problem has resolved itself to a semiempirical analysis, based on a large amount of experimental observation. It may seem rather arbitrary to apply any mathematical analysis, since the ultimate equations needed must be based on experiment. The treatment found in the literature on the subject is apparently partly a matter of mathematical correlation of data for the wide range of conditions that have to be considered and partly a matter of following in the paths of previous investigators. The Reynolds number represents one useful correlation in that the same numerical value serves to denote approximately the transition point between streamline flow and turbulent flow for a certain type of conduit, regardless of the fluid, pipe size, or driving force (flow rate). The friction factor represents another useful correlation in that somewhat the same curve is obtained for a range of conditions when the friction factor is plotted against the Reynolds number. The curve obtained depends much on the interior surface of the pipe or tubing.

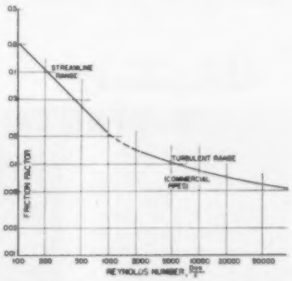


Fig. 1—Ranges of types of flow.

*Associate professor, petroleum and natural gas engineering, Pennsylvania State College.

STOP CORROSION BEFORE IT STARTS

Asbestos Pipe Line Felt is time tested and proven on the line. WHY EXPERIMENT?

Asbestos Pipe Line Felt has been used to protect underground pipe coatings for more than a quarter of a century. The coatings on thousands of miles of lines are protected by Asbestos Felt. Most major pipe line companies have personal experience as to its effectiveness.

NICOLET Asbestos Pipe Line Felt is not a thin foreign product in the enamel, but a rugged inorganic shield which protects the enamel insulation on the outside—where corrosion starts. NICOLET Felt is saturated with the same basic bitumens as the coating.

NICOLET Asbestos Pipe Line Felt can be made to your particular specifications.

WRITE FOR YOUR COPY OF THE NEW NICOLET CATALOG.

NICOLET* ASBESTOS PIPE LINE FELT

"the felt with a future"

*FORMERLY GAMA

The Felt With a Future

MANUFACTURED BY:
NICOLET INDUSTRIES, INC.
FORMERLY GAMA INDUSTRIES, INC.
70 Pine Street New York 5, N. Y.

DISTRIBUTED BY:
MIDDLE WEST COATING & SUPPLY
207-A Daniel Bldg. Tulsa, Okla.
P. O. Box 153 Ph. 2-5215 or 2-5216

Oil Accounting is
DIFFERENT!
this book →

CLEARS UP ACCOUNTING PROBLEMS UNKNOWN IN ANY OTHER INDUSTRY

"Practical Accounting for Oil Producers" is the only book ever written on this highly specialized subject. 656 pages of text, illustration and specimen voucher entries, 37 thorough chapters. But see for yourself what it can mean to you. Examine it 5 days – FREE. Or better, send us $9.50 and we'll imprint your name on the cover and pay all the postage. . . . Please letter name you want imprinted on coupon below.

ROSS-MARTIN COMPANY • Box 806-H
Tulsa 1, Oklahoma

Please send me_____copies of this book at $9.50 each

Name _____

Company _____

Address _____

City, Zone, State _____

MAKE YOUR NEXT
STEEL VALVE
A
BROWN VALVE

PROMPT DELIVERY
COMPLETE STOCKS

VERNON offers you the complete line of the famous Brown Valves. Used the world over for more than a quarter of a century, these valves are recognized throughout industry for their superior design, precision machining and dependable performance.

Brown STEEL VALVES

Write today for Engineering Data

A complete line of cast steel, swing check valves for use on steam, oil, oil vapor, gas and water. Available in most sizes for working pressures from 150 lbs. to 2500 lbs. Also complete line of globe, angle and steam throttle valves.

BROWN VALVE DIVISION
VERNON TOOL CO., LTD.
1103 Meridian Ave., Alhambra, Calif.
6226 Washington, Houston 7, Texas

CENTRIFUGAL PUMPS • DESANDERS
VIBRATING SCREENS
PIPE CUTTING PANTOGRAPHS
STEEL VALVES • STUFFING BOXES

CORROSION CONTROL

How to Combat Corrosion in Producing Wells

CORROSION will not occur unless water is present. If there is no liquid water, there is no problem.

It is possible to classify gas and oil wells into various categories. Trouble can be expected in wells producing water, while little corrosion is being encountered in wells producing oil of low b.s. and w. content.

Gas wells.—Carbon dioxide and organic acids accelerate the corrosive action of the water. Many wells produce carbon dioxide and acetic acid, while others produce hydrogen sulfide. Data have recently come to hand on a North Texas well, producing 43 per cent of hydrogen sulfide. This occurrence is posing a major problem in the selection of equipment to handle it.

Another problem which confronts the producer is that of corrosion due to electrolysis, the mechanism being:

$$Fe \rightleftharpoons Fe^{++} + 2e$$

$$2H^{+} + 2e \rightleftharpoons H_2$$

This reaction, called electrolytic corrosion, can be brought on by stray currents caused by pumping engines and power lines in the vicinity of wells and tanks.

This occurrence can also take place due to the dissimilarity of the metal itself. Due to its heterogeneous nature, there are different chemical materials in the steel having different electrical potentials and these react, setting up small local systems in the steel. The condition is accelerated by water, more so by salt water and worst of all, by oxygen, producing galvanic and electrolytic action.

Another type of corrosion is caused by bacterial action. Of the many forms of bacteria, the ones which are most common in causing corrosion are sulfate-producing bacteria, which are able to obtain oxygen for their necessary growth from sulfates. This corrosion is caused by materials liberated by the bacteria through their metabolism processes.

Acidic corrosion caused by the presence of organic acids, carbon dioxide, or hydrogen sulfide are all similar in general action since all of these compounds are weak acids and react to the extent of their ionization in the produced water.

Alkaline inhibitors. — Alkaline compounds which have been used with varied success in mitigating this corrosion include sodium hydroxide, sodium bicarbonate, and sodium carbonate. Carbonates should be avoided in presence of salt water containing large quantities of calcium and magnesium, to avoid the formation of insoluble deposits. Ammonia type of compounds have also been explored and are useful except when copper or brass is in the system.

It is not necessary to add alkaline compounds in sufficient quantity to neutralize all of the acidic material produced, but only enough to react with that portion which is dissolved in the produced water. The above type of chemicals must be added continuously to be effective.

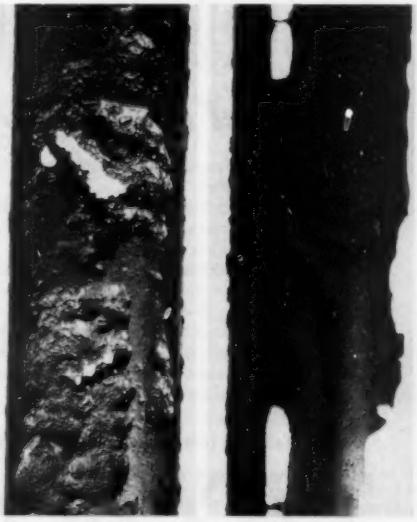
Film-forming inhibitors. — Two other widely used inorganic salts, sodium chromate or dichromate and sodium silicate, rely on the deposition of a film for their value as an inhibitor. The chromates react with the iron, forming the ferrous ion, and precipitating a protective film composed of a mixture of hydrated ferric and chromic oxides.

Sodium silicate develops a coating on the inner surface of the tubing which is alkaline in nature, insuring protection against the acids in the production. Best results are obtained when the coating is renewed at intervals. In many cases this is about every 3 months.

Organic inhibitors.—Organic preparations used as inhibitors rely on film formations covering the tubing surface in mitigating corrosion. They are prepared in both the liquid and solid (stick) forms. These work most effectively when large dosages are used during the period the film is being formed, followed by smaller amounts to maintain it in good repair.

Plastic coating.—Baked-on plastic-coated tubing has been in service for several years. Some isolated failures have occurred from blistering and peeling but generally the results are fairly satisfactory.

Alloy and plated tubing.—It has been reported that 9 per cent nickel alloy and 5 per cent nickel alloy tubing were in use. Both have good corrosion-resisting properties except in wells that produce salt water or as much as 9 per cent carbon dioxide.



Typical corroded sections removed from producing oil wells show the seriousness of this problem.

WeldELLS®

...have set their own standards

Many of the largest users of Welding fittings refuse to accept any other fittings than WeldELLS.

They have found that when the name, WeldELL, is stamped into a fitting, that fitting can be accepted without question for any service for which it is designed.

They have found that WeldELLS have features that please both the men who design and the men who erect welded piping . . . features that were pioneered by Taylor Forge . . . features that are combined in no other welding fittings.

They have found the answer to their every need in the greater range of sizes, weights and types of the WeldELL line . . . in the broader scope of materials.

Ask for up-to-the-minute facts about WeldELLS and Taylor Forged Steel Flanges.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS, General Offices and Works: P.O. Box 485, Chicago 90, Ill.
Offices in all principal cities. Plants at: Carnegie, Pa.; Fontana, Calif.; Hamilton, Ont., Canada

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

TRADE LITERATURE

1 KONTOL CORROSION PREVENTIVES. For the refinery and gasoline plant. This brochure explains eight advantages of Kontol corrosion protection, how it is applied, and methods of surveying corrosion rate. It includes a section on physical properties and hydrogen blistering. *Tretolite Co.*

2 SOLENOID VALVES. Illustrated booklet describes several new and improved high-pressure solenoid valves, showing construction and typical application, and which are suitable for all hydraulic systems handling noncorrosive fluids. *Waterman Engineering Co.*

3 EXPLO-SAFE AND WEATHERPROOF MOTOR CONTROLS, an eight-page multicolored brochure, includes illustrations and capacity data on a complete line of weatherproof motor starters, rated at from 1 to 100 hp. *The Arrow-Hart & Hegeman Electric Co.*

4 AUTOMATIC CONTROLS. Condensed General Catalog No. 52 contains information on pressure-regulating valves, instruments, control valves (air operated), and liquid-level controllers. It is profusely illustrated and contains specifications and ratings charts. *Mason-Neilan Regulator Co.*

5 DOUBLE-DECK FLOATING-ROOF TANKS. This 10-page illustrated pamphlet discusses uses and operating features of these vapor-saving storage tanks. A section is devoted to seal and seal mechanism device. Tank capacity and dimension charts are included. *Graver Tank & Manufacturing Co., Inc.*

6 CENTRIFUGAL SUMP PUMPS, an eight-page, two-color bulletin, illustrates and describes VS and VN sump pumps available in wet and dry pit types adapted to handling clear liquids, sewage, and other liquids containing solids. Sizes 1½ to 8 in., capacities to 1,000 g.p.m., and pressures up to 250 psi. *Warren Steam Pump Co., Inc.*

7 FITTINGS FOR PIPE EXTRUDED FROM TENITE. This book, with aid of detailed diagrams, describes fabrication of various fittings from extruded pipe lengths and the methods of installing these joints in pipe lines. Some discussion is also given to molded Tenite fittings and to special couplings, either Tenite or metal, approved for joining Tenite to metal pipe. *Tennessee Eastman Co.*

8 CHEMISTRY AND CHEMICAL ENGINEERING is a new catalog describing new petroleum and natural gas sources. Petroleum production engineering is offered along with shorter courses on petroleum production, natural-gas production and transmission, petroleum-refinery operation, and oil-field technology. *International Correspondence Schools.*

9 HEAVY-DUTY TRANSMISSIONS, a seven-page booklet, contains condensed specifications on the entire line of heavy-duty transmissions and auxiliaries. Data include number of speeds, type of mounting, whether truck or industrial application, approximate engine size, installation dimensions, weight, and other relative information. Cutaway illustrations of

FOR MORE INFORMATION . . . . use one of these cards

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, May 12, 1952

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....

OIL AND GAS EQUIPMENT Digest CHECK IT

major types and sizes of both unit transmissions and auxiliaries are shown. *Fuller Manufacturing Co.*

10 SELECTION, USE AND CARE OF ROPE is a 28-page booklet, printed in convenient handbook size, and amply illustrated, containing useful tables on rope sizes, weights, working loads and breaking strengths. It also gives simple formulas for the proper use of rope in slings and with block and tackle. *Tubbs Cordage Co.*

11 TEARS ENGINEERS is a brochure which describes and pictures facilities, organization, personnel, and performance record of a firm performing processing, detailing, and field construction of field processing, refining, and petrochemical plants. *Tears Engineers.*

12 CLAYTON GAS CARBURETORS is a folder of loose-leaf data sheets on gas carburetors designed for a wide selection of oil-field engines. It includes operating and installation instructions, and illustrations of each item in the line. *Clayton Carburetor Works.*

13 TRAY-TYPE DEAERATING HEATERS is an 11-page, multicolored bulletin which explains principles of successful deaeration and essential elements of a deaerating heater. Features of tray-type and spray-tray-type heaters are described in tabular form, and illustrated by detailed drawings with identification of all parts. *Graver Water Conditioning Co.*

14 BULLETIN 5204 describes standard and special gear drives for pipe-line service. It is profusely illustrated with examples of typical applications. *Western Gear Works.*

15 STAINLESS STEEL VAPOR CONDENSER. Attractive brochure explains these units offered in two basic designs, Model VT for condensing vapors through the tube side, and Model VS for condensing vapors on the shell side. Diagrams and complete specifications are included on each model. *Doyle & Roth Manufacturing Co., Inc.*

16 PROTECTING BURIED PIPES FROM CORROSION with Scotch plastic tapes is the subject of a new eight-page illustrated booklet. It describes both high-speed machine and hand-wrapping techniques for protecting natural-gas and water mains, joints, and leads from corrosive effect of soil chemicals, oils and fats, stray ground currents, and soil bacteria and fungi. Tables listing physical and electrical properties are given. *Minnesota Mining & Manufacturing Co.*

17 CRAWLER CRANE CATALOG describes the new American crawler crane with action views. It points up availability of interchangeable fronts—crane, shovel, dragline or pull shovel and lists over-all specifications. *American Hoist & Derrick Co.*

18 JOHNSONITE NO. 4 PLASTIC PIPE catalog discusses this rigid plastic pipe, which is light in weight, yet highly resistant to corrosion. It shows in detail physical characteristics, and also a weight comparison in pounds between plastic pipe and ordinary steel pipe. *Johnson Plastic Corp.*

19 WATER CONDITIONING. Handsome, leatherette-bound volume, in 5 by 7¼-in. size, contains 116 information-packed pages on such subjects as hydraulics, impurities in water, chemical conversions, saturated steam, chemicals used in water treatment, and chemical reactions. It presents a compilation of 77 tables, all valuable to engineers who work with water-conditioning problems. *The Permutit Co.*

20 TREATMENT OF LUBRICATING OIL. New eight-page folder on refining lubricating oils describes Filtrol fractionation and continuous contact filtration processes. *Filtrol Corp.*

21 MACWHYTE WIRE ROPES. This catalog is subdivided under the following headings: 6 by 7 Haulage or Standing Ropes, 6 by 19 Standard Hoisting Ropes, 6 by 37 Special Flexible Hoisting Ropes, 6 by 19 Extra Flexible Hoisting Ropes, 18 by 7 "Kilindo" Non-Rotating Ropes, Aircraft Cable, Corrosion-Resisting Ropes, Miscellaneous Ropes, Galvanized Ropes, Galvanized Strand, Slings, and Fittings and Lubricant. *Macwhyte Co.*

22 PRESSURE REGULATORS. A 44-page brochure describes and illustrates single and two-stage reduction regulators, and includes performance data and engineering drawings on accessories such as pressure-relief valves, adjusting and tension screws, flow gages, and flow meters. *National Welding Equipment Co.*

FOR MORE INFORMATION . . . . use one of these cards

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, May 12, 1952

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

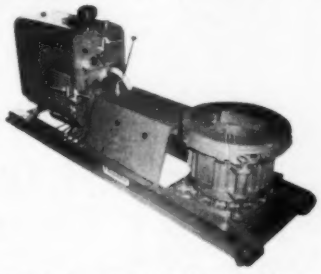
THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

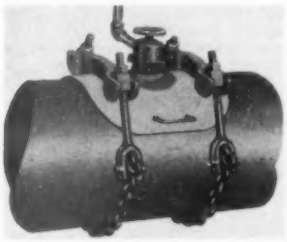
by Dan B. Miller

23 A NEW PACKAGED "FLUID DRIVE" SKID ROTARY UNIT designed to fit any rig is 12 by 4 ft. and weighs less than 6,000 lb. The Frank Model 9428 rotary table is of the direct-drive type, which eliminates the need of a reverse gear box due to being driven by a 70-hp. automotive engine through an automotive transmission. The engine and transmission are linked to the table by a fluid coupling which helps to eliminate the shock load on the drill pipe. The engine is equipped with a spark arrester. The unit is available with either manual or air controls for operation from driller's position. *Franks Manufacturing Corp.*



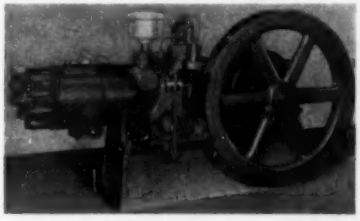
IT'S NEW CHECK IT

24 TIPTONS HIGH-PRESSURE PIPE-LINE PATCH is completely safe for use in repairing leaks on modern high-pressure pipe lines. Safety features include the steel ring on casting which protects the neoprene rubber gasket from welding heat when gasket is compressed: the 3/8-in. vent hole in body of patch which relieves heat pressure while welding patch on line; the rubber gasket which when compressed seals off the pressure; and the vent plug which permits venting away of gas, oil, or other fluids while the patch is being installed. The patch can be installed while line is in operation, saving fuel, work time, and shutdown time. Clamps hold rubber gasket in place while stringer bead is applied. Clamps are then removed and welding completed, vent plug is closed, and vent line and jacket removed. Plug is sealed by welding. Hydrostatic test with single set of clamps 700 psi. Hydrostatic test with double set of clamps 1,000 psi. *General Manufacturing Co.*



IT'S NEW CHECK IT

25 NEW HORIZONTAL TYPE, SINGLE-CYLINDER, TWO-CYCLE, DIESEL ENGINE. Designed as a companion power plant to the line of Lorain Model L, O, and R engines, the new unit has a 13-in. bore and stroke and continuous rating of 55 b.hp. at 325 r.p.m. The Model DA engine features tapered roller bearings for the crankshaft and auxiliary shafts. A wet sleeve cylinder liner of alloy cast iron assures long life and easy replacement in the field. The engine can be operated as a cold-starting full diesel, or can be converted in the field to burn natural gas or butane. The radiator-type cooling system assures adequate cooling under all load or atmospheric conditions. A Pickering governor, Air Maze oil-bath cleaner, McCord lubricator, and built-in 7½-hp. gasoline starter are standard equipment. A Twin Disc clutch is optional equipment. Over-all dimensions are: length 117 in.; width 55 in.; height 60 in. Domestic shipping weight is 8,000 lb.; export shipping weight 9,050 lb. *White-Roth Machine Corp.*



IT'S NEW CHECK IT

26 DUAL-TEMPERATURE PIPE INSULATION for pipe lines operating at low temperatures or at alter-

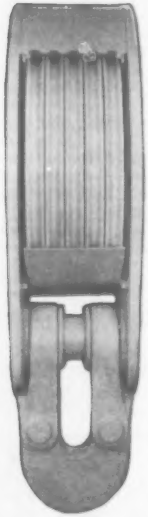
The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

nate cycles of high and low temperatures is made of fibrous glass bonded with a thermosetting binder and is

accurately preformed in easy-to-apply hemicylinders and segments that fit all standard pipe and tubing sizes. A vapor barrier, composed of laminations of asphalted kraft paper and aluminum foil adhered to the Fiberglas insulation with a bituminous adhesive, provides effective condensation control on cold lines passing through warmer temperatures and permits exceptionally economical operation of such pipes. When used as a vapor barrier, the dual-temperature insulation jacket prevents condensation on the surface of pipes and increases storage space by eliminating dripping in the area below the pipes. To seal the end lap joints between sections, a 4-in. strip of vapor barrier paper is supplied. These strips, together with the jack flaps, are sealed with Fiberglas vapor barrier adhesive. If desired, metal bands may then be placed at the edges of each end lap and in the center of each section. *Owens-Corning Fiberglas Corp.*

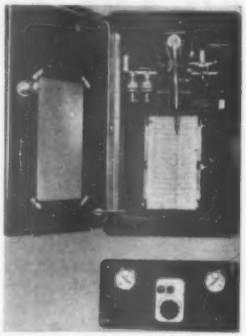
IT'S NEW CHECK IT



27 NEW TYPE "PN" TRAVELING BLOCK is of the narrow type with the center-to-center distance between sheaves only 3¾ in. The narrow width allows the use of this block on deep holes where pipe space is at a premium. Sheave diameter of 52 in. reduces bending stresses on the wire line. Sheaves are grooved to A.P.I. dimensions. Each sheave is mounted on a radial roller bearing and is separated and retained in position by a row of spherical ball bearings. The radial rollers are prevented from skewing as they carry no thrust load on the ends. This new block has a rated capacity of 300 tons at 100 r.p.m. Bearings and sheaves are interchangeable with the Type "KN" crown block. *Beaumont Iron Works Co.*

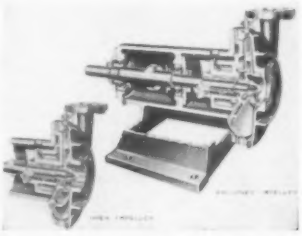
IT'S NEW CHECK IT

28 NEW INSTRUMENT FOR CONTROLLING GAS CALORIFIC VALUE. The two basic parts of the controller are the new Sigma Mark 2 calorimeter and the Kent Mark 20 pneumatic control unit. The calorimeter is made up of a gas-flow regulator, measuring device, and recording mechanism, the function of the regulator being to supply gas to the measuring device at a rate which would be constant if reduced to standard temperature and pressure. The control mechanism is fitted within the instrument case. A control setting pointer is mounted concentrically with the recorder pen; and the controller instantly detects, and takes action to correct, any deviation between the pen and the pointer. The deviation is converted into an air-pressure change within the controller system which moves a control valve in the diluent gas main to correct the calorific value of the gas. *George Kent, Ltd.*



IT'S NEW CHECK IT

29 TYPE DS CHEMICAL PROCESS PUMP has been designed for pumping most process liquids, either hot or cold, in moderate capacities against low, medium, or high heads, with special emphasis on corrosive and abrasive liquids with solids in suspension up to 5 per cent by volume. It is available in discharge sizes from 1 in. through 6 in. Enclosed or open impeller design is optional construction. Using the enclosed impeller, capacities up to 600 g.p.m. are provided; using the open impeller offers a capacity range up to 1,000 g.p.m. The Type DS will operate against heads to 231 ft. Driver is standard, horizontal, electric motor mounted on common base with pump. It is offered in two basic designs: one is grease lubricated, the other is oil lubricated. Standard bearing construction for operation at temperatures to 250° F. is grease lubricated. Above 250° to 600° F. oil-lubricated construction is utilized. However, the latter construction is also available for pumps handling liquids to 250° F. Cooling coils are provided in the oil-lubricated design for maintaining oil supply at proper temperature. *Peerless Pump Division, Food Machinery and Chemical Corp.*



IT'S NEW CHECK IT

30 OIL-FIELD FINISHES. Line has been engineered to fit the particular needs of the oil industry and to meet all requirements of the recently adopted standard safety color code for drilling rigs. Introduced with this line are the color cards which carry, in detail and in full color, the safety color code for drilling rigs adopted by the safety committee of the American Association of Oilwell Drilling Contractors. The cards also list with descriptions, the industrial color code and the piping code. The 12 colors, plus black and white, in the new line are glossy, quick-drying colors of excellent durability and color retention designed to withstand the hot sun, blowing sand,

R A GOOD
EMENT JOB
SPECIFY
B and W LATCH-ON CENTRALIZER
with the NEW
KON-KAVE BOW
DROP-FORGED
FROM THE
FINEST ALLOY SPRING STEEL
AND
DOUBLE HEAT TREATED
B and W Incorporated
Well Completion Specialists
GULF COAST
P. O. Box 5266
Houston 12, Texas
WE-ntworth 6603
WEST COAST
3545 Cedar Avenue
Long Beach 7, Calif.
Long Beach 4-8366

and arid or humid climates. They may be sprayed on or brushed on. *Jones-Blair Paint Co.*

IT'S NEW CHECK IT

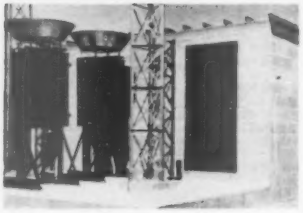
31 BLASTCRETE MACHINE is designed to handle a wide variety of materials including cement, sand, lightweight aggregates, refractories, light gravels, and other sandy, granular, or powdery materials. The operator has complete control of air pressure and material volume and all adjustments can be regulated while the machine is in operation. Due to the design of the agitating and material metering mechanisms, a very small amount of air is required for this purpose, thus permitting the use of smaller-capacity air compressors. All wearing parts have been reduced to a minimum. Available in three sizes. Prompt delivery. *Blastcrete Equipment Co.*

IT'S NEW CHECK IT

32 NEW PORTABLE MANCO SERIES 15 GUILLOTINE. A click of the latch opens the anvil; material to be cut is laid in position, and main body of tool is raised back to vertical position which automatically locks tool in cutting position. Cutting time as little as 7 seconds can be obtained, depending on pump assembly used. Series 15 exerts up to 50 tons thrust, which makes clean cut through up to 1¾-in. wire rope. Heavy-duty shear-type blades are easily removable for resharpening when needed. Frame design is heat-treated high-tensile-steel. Latest type oil seals in honed cylinders prevent oil leakage. The basic cutting unit is available with a variety of electric and air-hydraulic pump assemblies, including foot-lever and remote control operations. *Manco Manufacturing Co.*

IT'S NEW CHECK IT

33 INDUSTRIAL 24-CHANNEL MICROWAVE RELAY SYSTEMS. A crosscountry communications system utilizing this advanced design multiplex equipment is capable of handling either 24 normal voice circuits, more than 400 teletype or telemetering operations, nearly 1,000 remote supervisory control functions or telegraph circuits, or any combination of these facilities. This new multiplex equipment permits the users of previously supplied Motorola Microwave 10 or 12-channel systems to expand them up to 24 channels when desired. The new equipment, featuring double frequency modulation subcarrier-type multiplexing, incorporates the same principles as 10 and 12-channel systems previously supplied, and operates in the 6575-6875-megacycle frequency band. Motorola microwave equipment is available in two basic designs, remote-type installation for use where the customer already has housing facilities for the radio equipment and power supplies, and "micropackage" for complete package installation. *Motorola.*



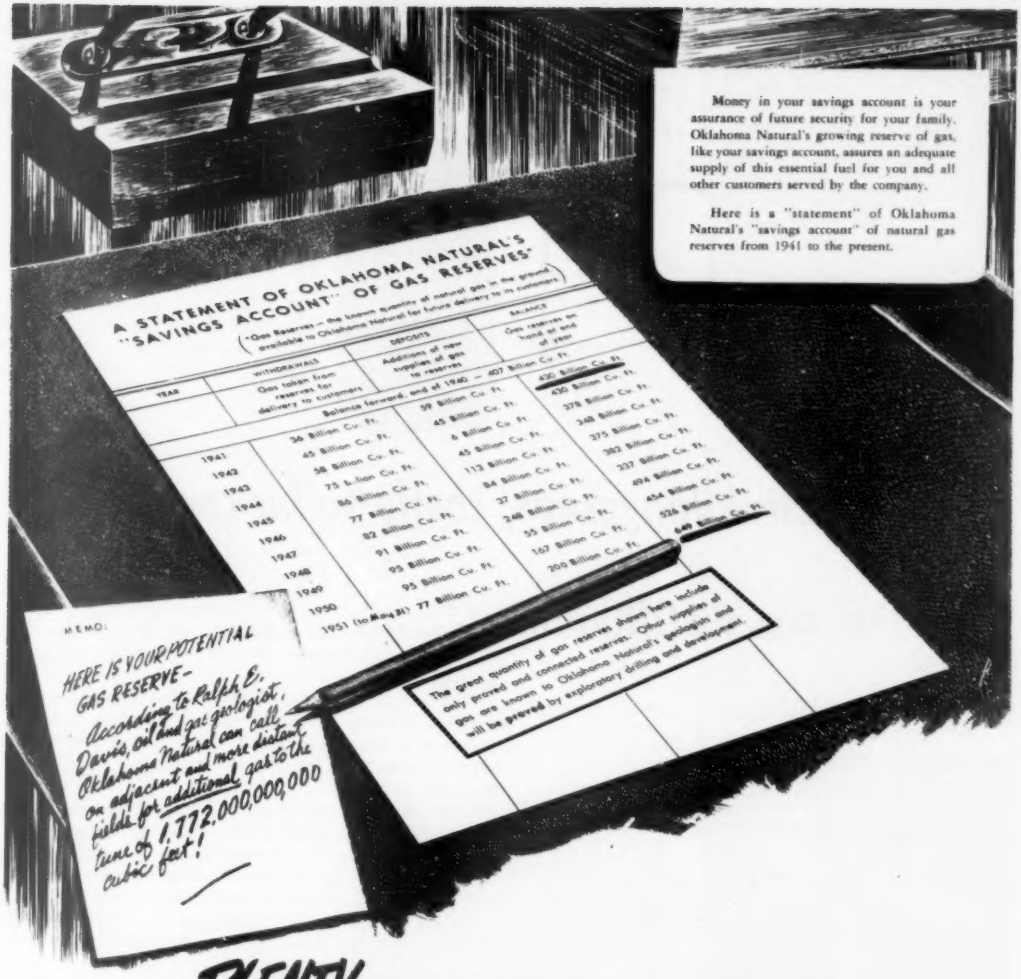
IT'S NEW CHECK IT

34 CERAMIC COATINGS FOR METALS extend their life in high-temperature use. The coatings conserve scarce materials in two ways: they make parts made of alloys rich in strategic elements last longer when subjected to high temperatures, by preventing oxidation and corrosion; and they allow the more easily obtainable steels, such as stainless, to be substituted for hard-to-get higher alloys without cutting the usable life of the item. Among industrial applications already tested are; petroleum-refining equipment, unit heater components, oil-burner parts, industrial bellows for chemical process industries, industrial gas-turbine parts, thermocouple components, chemical processing equipment, heat exchangers, and industrial furnace parts. *Solar-Aircraft Co.*

IT'S NEW CHECK IT

35 CORROSIONPROOF PLASTIC PIPE has many applications in petroleum production, water wells, chemical processing, and general piping of pure or corrosive liquids and gases. Plastex pipe has positive resistance against rust, rot, and electrolytic corrosion and the smooth interior surface provides maximum transmission. It is extremely light-weight, cutting down on freight, handling, and installation costs. Installations above or below ground are quickly accomplished without special tools and connections are easily made with cemented plastic fittings. Plastex comes in a complete range of standard pipe sizes from ½ up to 6-in. Coils are made up to 400 ft. long and straight lengths, 25 ft. long. *The Plastex Pipe & Extrusion Co.*

IT'S NEW CHECK IT


Money in your savings account is your assurance of future security for your family. Oklahoma Natural's growing reserve of gas, like your savings account, assures an adequate supply of this essential fuel for you and all other customers served by the company.
Here is a "statement" of Oklahoma Natural's "savings account" of natural gas reserves from 1941 to the present.
A STATEMENT OF OKLAHOMA NATURAL'S "SAVINGS ACCOUNT" OF GAS RESERVES*
(*Gas Reserves – the known quantity of natural gas in the ground available to Oklahoma Natural for future delivery to its customers)
YEAR
WITHDRAWALS Gas taken from reserves for delivery to customers
DEPOSITS Additions of new supplies of gas to reserves
BALANCE Gas reserves on hand at end of year
Balance forward end of 1940 – 407 Billion Cu. Ft.
1941 36 Billion Cu. Ft. 59 Billion Cu. Ft. 430 Billion Cu. Ft.
1942 45 Billion Cu. Ft. 45 Billion Cu. Ft. 430 Billion Cu. Ft.
1943 58 Billion Cu. Ft. 6 Billion Cu. Ft. 378 Billion Cu. Ft.
1944 75 Billion Cu. Ft. 45 Billion Cu. Ft. 348 Billion Cu. Ft.
1945 86 Billion Cu. Ft. 113 Billion Cu. Ft. 375 Billion Cu. Ft.
1946 77 Billion Cu. Ft. 84 Billion Cu. Ft. 382 Billion Cu. Ft.
1947 82 Billion Cu. Ft. 37 Billion Cu. Ft. 337 Billion Cu. Ft.
1948 91 Billion Cu. Ft. 248 Billion Cu. Ft. 494 Billion Cu. Ft.
1949 95 Billion Cu. Ft. 55 Billion Cu. Ft. 454 Billion Cu. Ft.
1950 95 Billion Cu. Ft. 167 Billion Cu. Ft. 526 Billion Cu. Ft.
1951 (to May 31) 77 Billion Cu. Ft. 200 Billion Cu. Ft. 649 Billion Cu. Ft.
The great quantity of gas reserves shown here include only proved and connected reserves. Other supplies of gas are known to Oklahoma Natural's geologists and will be proved by exploratory drilling and development.
MEMO:
HERE IS YOUR POTENTIAL GAS RESERVE –
According to Ralph E. Davis, oil and gas geologist, Oklahoma Natural can call on adjacent and more distant fields for additional gas to the tune of 1,772,000,000 cubic feet!

PLENTY OF NATURAL GAS IN OKLAHOMA

Oklahoma Natural's gas reserves on hand today are over 50% *greater* than they were in 1940. This, despite the fact that its withdrawals have increased from year to year. In 1949 and 1950, for example, withdrawals were *twice* those in 1941. In spite of these withdrawals, your gas company has been able to keep well ahead of the ever increasing demand for gas by constant exploration and development activities.

So, you see, Oklahoma Natural Gas Company has plenty of gas — more than it has ever had. Moreover, it will continue its long range efforts to find more and more natural gas so your grandchildren and great-grandchildren can depend upon an even larger "savings account" of gas reserves to use for Oklahoma's ever expanding development.

Jos. Burris
President

Oklahoma Natural's vast plant facilities are wholly dedicated to growing Oklahoma, for use in Oklahoma by Oklahomans. Your gas company does not export one cubic foot of gas to other states.

OKLAHOMA NATURAL
Gas Company

Control dangerous, costly sulfur compounds

-in gas distribution

THE CONSOLIDATED TITRILOG provides an effective and economical means of continuously and permanently recording the concentration of sulfur compounds in a gas stream.

This instrument is used extensively in monitoring odorant injection in natural gas and guarding against corrosive sulfur compounds harmful to pipe lines and other equipment. Detecting concentrations as low as 0.1 part per million or .005 gr./100 cu. ft., the Titrilog records quantitatively H_2S, SO_2, mercaptans and organic sulfides. These and other sulfur compounds may be determined over a wide range of concentrations.

If you are buying, selling, blending, or treating field gas or odorizing gas in distribution lines, you'll find the Consolidated Titrilog your best gage for control. Write today for complete details given in Bulletin CEC-1810.

-in air pollution

Either model of the Titrilog may be used effectively for the control or study of air pollution. The concentration of dangerous H_2S is shown on a continuous or instantaneous basis—permanent recording and audible warning protect plant personnel and community. Portable model may be moved to locate source of contaminants. Will not react to carbon dioxide, carbon monoxide, ammonia, or hydrogen. Unsaturated hydrocarbons produce a negligible error because of their low reaction efficiency. Investigate this safeguard against plant or community air pollution.

Consolidated Engineering
CORPORATION
300 No. Sierra Madre Villa, Pasadena 8, California

CEC

Analytical Instruments for Science and Industry

Titrilog

Two models—26-102 stationary unit, 18½" x 22½" x 66" and 26-103 portable, approximately 50 lbs. Both are offered only on a rental basis which includes installation, service, maintenance and operating supplies.

PIPE LINES

Sun Pipe Line Plans Two New West Texas Crude Lines

DALLAS. — Sun Pipe Line Co. (Pennsylvania) is planning installation of two new crude pipe lines this year to bridge gaps in its West Texas system.

A 13-mile line will be laid to connect the Salt Creek area of Kent County to Sun Oil Co.'s Brice lease in the Snyder area. This system now gathers all of Sun's Scurry County production and delivers it to the Colorado City terminal of Basin Pipe Line System.

The second project will be a 34-mile line extending north from Jameson field in Coke County to the Colorado City terminal. This crude now is being transported by other pipe-line companies, but will be diverted to West Texas Gulf Pipe Line Co.'s new trunk when it is completed.

As one of the owners of the 26-in. West Texas Gulf line, now under construction, Sun will supply part of the crude cargo.

The new lines will give Sun a 200-mile pipe-line network in West Texas. Crude gathered from Sun leases will be carried via the West Texas Gulf line to Wortham. From Wortham part will be diverted to Longview, the remainder will go to Beaumont. The Longview crude will be delivered to Mid-Valley Pipe Line Co. and transported to Sun's Toledo refinery. Crude received at Beaumont will be loaded aboard tankers and carried to Sun's Marcus Hook, Pa., refinery.

Lone Star Officially Takes Over Former United System

DALLAS.—Lone Star Gas Co. has officially taken over operation of a 678-mile network of natural-gas lines formerly owned by United Gas Corp., following special closing ceremonies held recently in Houston on the $5,692,325 transaction.

The gas distribution, production, and transmission properties were purchased by Lone Star from Martin Wunderlich and Lee Aikin, who in turn had acquired them from United.

The pipe-line system extends from the East Panhandle field of Texas south to Wichita Falls and from Young County to Wichita Falls.

Lone Star is operating newly acquired gas-service facilities in 14 towns in Northwest Texas. These constitute what was referred to as United's Wichita Falls district and include holdings at Wichita Falls, Wellington, Vernon, Quanah, Newcastle, Memphis, Kirkland, Jean, Iowa Park, Dodson, Chillicothe, Childress, Burkburnett, and Acme, Tex.

Prior to the purchase, Lone Star and United operated competitively in Chillicothe, Iowa Park, Vernon, and Wichita Falls.

The new towns have been consolidated with Lone Star's West Texas distribution division, headed by R. H. Gray, Abilene, as superintendent.

Lone Star plans to lay about 70 miles of 20-in. transmission lines to strengthen the gas supply for the newly acquired area. The lines will extend from Garvin County, Oklahoma, to the company's compressor station at Petrolia in Clay County, Texas.

Cities Service Gas to Lay 20-In. Line, Add Compression

WASHINGTON.—Cities Service Gas Co., Oklahoma City, has received Federal Power Commission authorization to install 1,360-hp. in compressor units at two existing stations in Okla-

East From the Ohio

An H. C. Price Co. spread under Supt. R. K. Shivel kicked off here recently working east from the Ohio River on Texas Eastern Transmission Corp.'s big 30-in. natural-gas trunk line. Location is near Moundsville, W. Va., where spread headquarters is maintained. A second Price spread, headquartered at Woodsfield, Ohio, under Supt. Charles Ice, was scheduled to start at the same point working west.

PERRAULT

★ PIPE COATING AND WRAPPING MACHINES LINE TRAVELING AND STATIONARY

★ PIPE CLEANING AND PRIMING MACHINES

★ TAR HEATING KETTLES

★ BENDING MACHINES

★ PIPE CRADLES

★ PIPELINE SUPPLIES

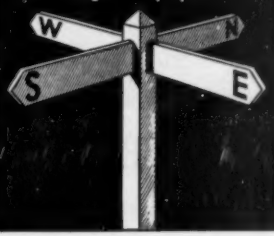
"EVERYTHING FOR THE PIPELINER"

PERRAULT Brothers, Inc.

1130 NO. BOSTON, TULSA, OKLA. • 5-1103

Export Office:
30 ROCKEFELLER PLAZA
NEW YORK, N.Y.
CIRCLE 6-6260

"serving all pipelines"



PIPELINE COATINGS
and
WRAPPING MATERIALS

S. D. DAY COMPANY

1973 WEST GRAY HOUSTON, TEXAS PHONE JU 2431

RIVERS ROCK or FOREST

IT'S AN OKLAHOMA Contracting JOB!

OKLAHOMA
On the Job
Since 1915

IT'S AN OK JOB IF IT'S DONE BY
OKlahoma
CONTRACTING CO.

6612 HARRY HINES
DALLAS, TEXAS

homa and Missouri and to lay 15.4 miles of 20-in. line to replace a 16-in. line in Kansas.

The new facilities include a 340-hp. addition to Cities Service's Welch compressor station in Craig County, Oklahoma, and a 1,020-hp. addition to its Pierce City station in Lawrence County, Missouri. The new 20-in. line will be laid in Montgomery and Labette counties, Kansas.

The program will increase capacity of the company's Quapaw, Okla., to Springfield, Mo., system from 123,518,000 cu. ft. to 130,263,000 cu. ft. per day, representing Cities Service's estimate of its 1952-53 peak-day demand.

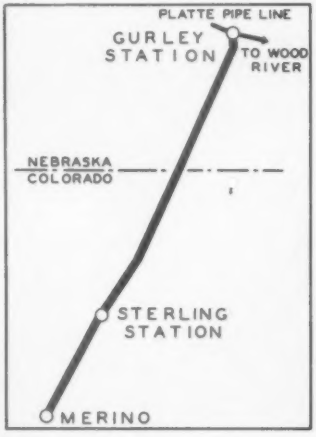
Estimated over-all capital cost of the project is $811,000. The new line will account for $545,000 of the total, the compressor additions for $266,800.

Great Lakes Gets O.K. on Addition of New Oil Line

WICHITA.—Great Lakes Pipe Line Co. has been granted authority by the Kansas Corporation Commission here to add 13 miles of line to its oil-gathering system in the state.

The 8-in. line runs from Potwin, Kans., to Eldorado where it will connect with Great Lakes' pump station at Eldorado. It is leased from Vickers Petroleum Co., Inc., of Wichita.

Great Lakes connects the Oklahoma



NEW STERLING SYSTEM will have an initial capacity of 42,000 bbl. a day. The system operated by Toronto Pipe Line Co. will comprise 53 miles of 12-in. line from Sterling to Gurley, Neb., 20 miles of 10-in. line from Merino to Sterling and miscellaneous feeder lines. All of these will feed into the Platte Pipe Line Co. trunk line extending from Wyoming to Wood River, Ill. Participating owners are Toronto, Shell Pipe Line Corp., and Texas Pipe Line Co.

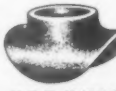
EXCEL-SO
SEPARATORS
Now used by largest products pipeline operators to remove free water and solids from stream

EXCEL-SO
COMBINATION SEPARATOR AND DEHYDRATORS
are now used by many major companies to dehydrate LPG at bottling plants and bulk terminals

EXCEL-SO
SEPARATORS AND MICRONIC FILTERS
for 5 micron efficiency built in capacities 10 to 2000 G. P. M.

WARNER LEWIS COMPANY
P. O. BOX 3096 • TULSA, OKLA.

STEEL TURNBUCKLES
¼", ⅜", ½", 1¼" and 2" diameter carried in stock, in 6", 12", 18" and 24" length. Black or Galvanized.
Write or wire for prices and delivery.
NORRIS BROTHERS, INC.
Robinson, Illinois

See Composite and Refinery Catalogs, or Write for Folder on
FLEET-LINE
PIPE SADDLES
Nozzle sizes from ½" to 24"

ASTM A234
STEEL FORGINGS, Inc.
P. O. BOX 276-B SHREVEPORT, LA

Welcome to The Shamrock
HOUSTON
"AMERICA'S Magnificent HOTEL"
Luxurious Accommodations
Incomparable Service
Reasonable Rates
GLENN McCARTHY, President
M. JACK FERRELL, Managing Director

PROMPT SHIPMENT FROM DALLAS STOCK
COMPLETE LINE OF Wood's POWER TRANSMISSION EQUIPMENT
WOOD'S PRODUCTS
SHEAVES • FLAT BELT PULLEYS • HANGERS
PILLOW BLOCKS • COUPLINGS • BEARINGS
COLLARS • "SURE-GRIP" SHEAVES AND PULLEYS • "SURE-GRIP" STANDARD, SUPER AND STEEL CABLE V-BELTS • COMPLETE DRIVES
T. B. WOOD'S SONS COMPANY
1117 W. COMMERCE ST., DALLAS, TEXAS
Main Office & Factory: Chambersburg, Pa.
Branches: Boston, Mass., Newark, N. J., Cleveland, O.

and Kansas production area with markets in Nebraska, Iowa, the Dakotas, Illinois, and Minnesota.

Mississippi River Fuel Seeks O.K. on Compressor Program

WASHINGTON.—Mississippi River Fuel Corp., St. Louis, is seeking Federal Power Commission approval of a compressor-station program which would raise its rated daily sales capacity to 450,000,000 cu. ft. of natural gas per day.

The company proposes installation of 17 compressor units totaling 13,385 hp. in seven existing stations and one new station on its transmission system.

Two of the units would be purchased, the other 15 removed from existing stations in Louisiana and relocated and installed in Arkansas and Missouri stations.

The one new station would be located near St. Genevieve, Mo.

Service Adding to Crude System in Beaver Lodge

TIOGA, N. D.—Service Pipe Line Co. is scheduled to begin laying this week about 6 more miles of 4-in. crude-gathering line in Beaver Lodge field of Williams County, North Dakota, to hook up new production in the area.

The new line will connect leases now being drilled south of Tioga. These include the Amerada-Marvin Iverson, Amerada-Josey Knutson, Amerada-Clifford Nylander, Amerada-North Dakota A, and other locations.

Seven Base Stations, Eight Mobile Units O.K.'d by FCC

WASHINGTON.—Construction permits for seven base stations and eight mobile units in the petroleum-radio service have been granted by the Federal Communications Commission, as follows

Ohio Fuel Gas Co., two base stations near Galion and Athens, Ohio, to operate on a frequency of 33.38 mc.

Texas Eastern Transmission Corp. one base station near Baytown, Tex., to operate on 48.94 mc.

Sun Pipe Line Co., three base stations near Daisetta, Humble, and Conroe, Tex.

Trunkline Gas Co., eight moble units on 49.02 mc. along the company pipe line between McAllen, Tex., and Tuscolo, Ill.

Southern Union Gas Co., one base station at Alameda, N. M., to operate on 158.31 mc.

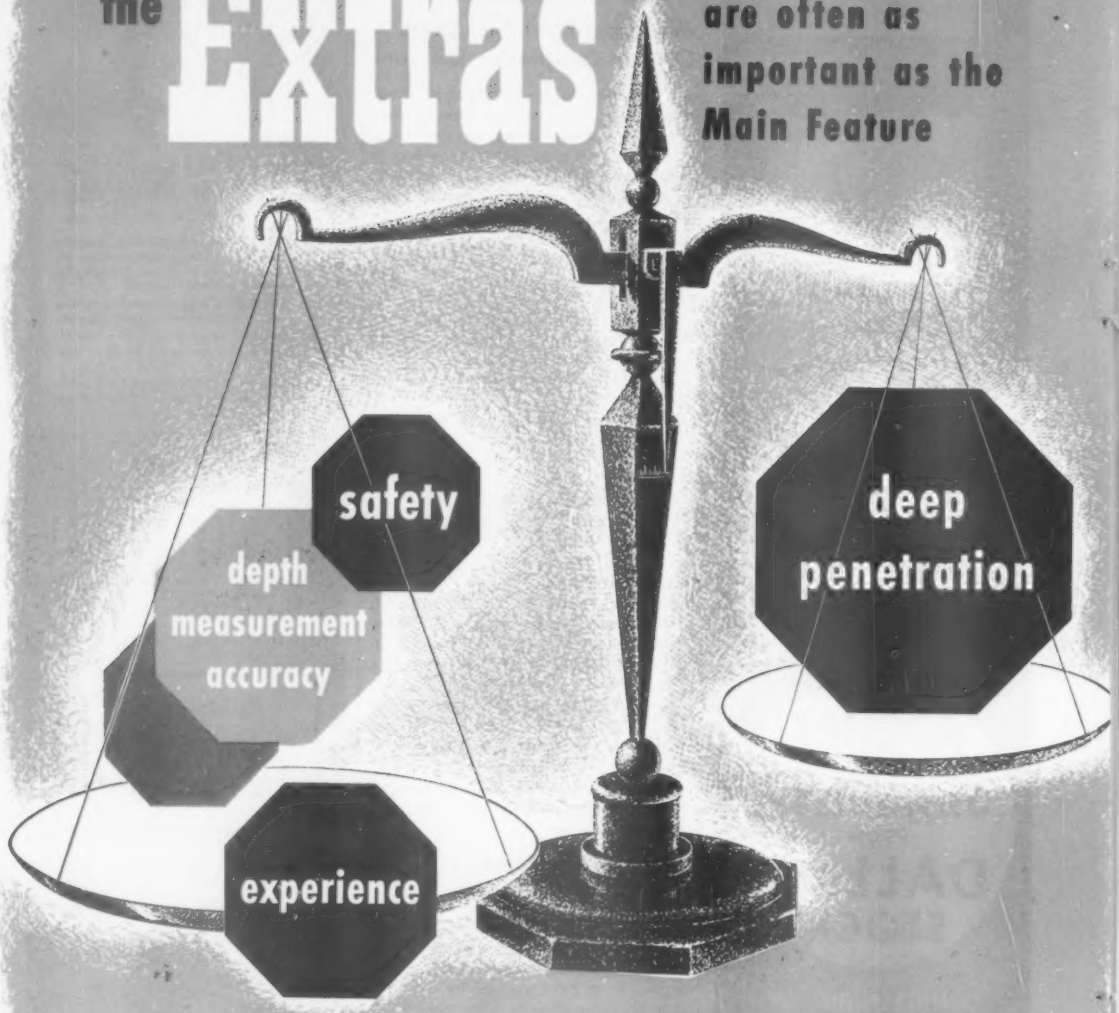
Ike was Insistent

"FLOAT IT IN OIL — PACK IT IN SILK — SUSPEND IT ON SPRINGS — THAT SHIPMENT'S GOTTA REACH MY CLIENT OK!"
Well OK, Ike
PROCESSING AND PACKAGING: Scientific processing against corrosion, moisture, air, dust, all climatic conditions. Packaging for export or domestic shipment.
DOCUMENTATION: Preparation and forwarding the special documents in export shipping.
AIR SHIPPING: As agent for International Air Transport we arrange all details of shipment by air.
COUNSELING: At no obligation we will advise you on many of the complicated details of export shipping.
TULSA CRATING CO.
519 SO. ROCKFORD • TULSA 10, U.S.A.
PHONES 3-6482, 3-3492

"Lining up a road section of 30" pipe line"

HOUSTON CONTRACTING COMPANY
General Contractors
OIL • GAS • GASOLINE • WATER PIPE LINES
LAURENCE H. FAVROT R. P. GREGORY GEO. A. PETERKIN
2707 FERNDALE PLACE HOUSTON 6, TEXAS

the Extras are often as important as the Main Feature



You get them all in KONESHOT the "plus-value" shaped-charge perforating

AK 505

LANE WELLS

Tomorrow's Tools - Today!

20 years of Proven Strength Service

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Among the

Drilling Contractors

Increase in Active Rigs Sets New 1952 Record

An increase of 122 in the number of operating rotary rigs in the United States and western Canada during the week ended May 5 boosted the total to 2,976, the greatest number reported for any week so far this year. Active rigs in the United States totaled 2,815, an increase of 101 during the week, and in western Canada there were 21 more rigs running than during the previous week.

Largest area increases were in Oklahoma and Kansas. Each of these states had 31 more rigs working than during the previous week. Only two areas, Arkansas-North Louisiana-East Texas and the Pacific Coast, reported decreases and these were small. Overall, there were 467 more active rigs during the week than during the corresponding week a year ago.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 5-5-52	Change week ended 4-28-52	Change week ended 5-7-51
Gulf Coast	610	+ 13	+ 62
N. & W. Tex.-N.M.	1,057	+ 12	+203
Ark.-N. La.-E. Tex.	143	— 5	— 3
Oklahoma	346	+ 31	+ 50
Kansas-S. Nebraska	177	+ 31	+ 23
Illinois-Eastern	125	+ 10	— 7
Rocky Mountains	198	+ 10	+ 69
Pacific Coast	159	— 1	+ 16
Total U. S.	2,815	+101	+413
Western Canada	161	+ 21	+ 54
Total	2,976	+122	+467

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 236 and 237.

Justiss-Mears Drilling Co., Jena, La., has a contract with James L. Duffy and Jack P. Harrington for a 6,800-ft. test to be drilled in Escambia County, southern Alabama. The new operation, 1 J. S. Nolin, in the C NE SE 1-1n-6e. Location is about 5 miles northeast of Atmore and 13 miles west of the new Pollard field, being developed by Humble Oil & Refining Co.

Nuckolls-Bell Drilling Co., Oklahoma City, has been awarded contract for Big Chief Drilling Co. and Bay Petroleum Corp. 1 Kendricks, newly disclosed Layton sand test in an area of largely abandoned production in Lovell field, Logan County, Oklahoma. The new start is in NE NW SE 21-18n-4w, with objective depth of 5,000 ft.

New Kansas Drilling Firm

Saline Drilling Corp. has completed incorporation procedure at the office of the secretary of state at Topeka, Kans. The new oil and gas drilling and production firm will be managed by Loren W. Hallam, Salina, Kans.

Sunnyland Drilling Co., Natchez, Miss., which has been drilling for Humble Oil & Refining Co. in the Pollard area of Escambia County, in southern Alabama, has contracted for an addition test, 1 L. G. Crosby, C NE NE 13-1n-8e. Hole is projected to the new pool's Tuscaloosa pay zone.

Survey Drilling Co., Dallas, is starting another stratigraphic test for Gulf Refining Co. in Wilkinson County, southwestern Mississippi. It is 2 Edna W. Sessions, located in 29-3n-3w, 1½ miles north of Lanehart. This company has been kept busy for several months on a series of such tests for Gulf in the general area.

Fortenberry Drilling Co., Natchez, Miss., has a rig working for Humble Oil & Refining Co. at 1-B Robert Emery, Jr., a projected 6,500-ft. Wilcox test, in Adams County, Mississippi.

Foster Drilling Co., Cushing, Okla., holds the contract for a 5,300-ft. Bartlesville test in Logan County, Oklahoma, at Powel Briscoe, Inc., 1 Alice Le Grande in SW NE SW 26-15n-1w. The wildcat is located northeast of Coon Creek pool.

Tilley Drilling Co., Wewoka, Okla., contractor on a new Red Fork sand discovery in Lincoln County, Oklahoma, the Jon Carson 1 Jones, 1 mile north of Merrick, will drill a west offset to the discovery well immediately. The discovery well is located in SW SW NW 7-16n-2e.

Delaney Drilling Co., Tulsa, has the contract for Skiles Oil Corp. 1 George Smith "A," NE SW NE 2-13n-3e, 2 miles west and ½ mile south of Midlothian, about 7 miles southwest of

You will pull fewer drill strings because of joint failure if you use 'Bestolife Lead Seal Tool Joint and Casing Compound. Standard of the oil industry for 20 years. Unconditionally guaranteed. Sold and exported by supply houses throughout the world.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

Standco
NO-SMOKE
STANDCO BRAKE LINING
Is the driller's best friend because it makes the easiest brake known and "feeds off evenly while drilling." It never scores brake rims. See pages 3608-3613. Composite Catalog.
Standco Brake Lining Co.
HOUSTON

CASH AVAILABLE
for participation in or outright purchase of producing oil properties.
Also interested in leases in or near established fields anywhere in U.S.A.
Please give complete information in first letter to
Western Central Petroleums, Inc.
32 Broadway, New York, N. Y.
Reference—Chase National Bank

THIS INFERNO DOUBLE CYLINDER FIRING CONTROL

will make your firemen happy. It will automatically keep the pressure in your boilers at any desired point. It takes all the guess work out of firing. And it will cut the fires on or off as fast or slow as needed.

Simple to install—simple to operate. Low maintenance cost. Sold through your favorite supply store or direct. Write for Bulletin 8B.

The INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

Chandler in Lincoln County, Oklahoma. The projected rotary test will be taken to 4,300 ft.

Penrod Drilling Co., Shreveport, holds contract for H. L. Hunt 2 C. F. Farrar, south offset to the first confirmation attempt in Rossy Bayou field, Concordia Parish, Louisiana. The discovery well is the 1 Farrar, in 4-6n-7e.

Tippett Drilling Co. has the contract for Hunt Oil Co. 1 W. E. Thurman, in NW 6-23n-10w, Springhill field, Webster Parish, Louisiana.

W. C. Curry Drilling Co., Shreveport, is contractor for Crow Drilling Co., Inc., 1 W. F. Thurman, a newly started operation in 12-20s-23w, Columbia County, Arkansas. It is in the Springhill field.

C. G. Glasscock Drilling Co., Corpus Christi, has moved a rig to a wildcat location 18 miles southwest of Corpus Christi, Nueces County, Texas, where it will drill for Republic Natural Gas Co. at 1-111 Chapman Ranch. Hole is projected to 8,000 ft.

Texita Drilling Co., San Antonio, has rig on location for a scheduled 6,600-ft. wildcat test to be drilled for Tri-Mark Oil Co. at 1 Jean H. Cyrus and associates, 20 miles south of Corpus Christi, in Nueces County, lower Texas Gulf Coast.

C. W. Beene Contracting Co., Shreveport, has the contract for a new test at West Lewisville field, Lafayette County, southwestern Arkansas. The new venture is Thomas F. Loop et al 1 S. J. Rook et al in NE SW 17-16s-24w.

Calvert Drilling, Inc., Olney, Ill., has purchased a new IDECO H-30 rotary. It now operates six rigs in this area.

Hilburn Drilling Co., Shreveport, has the contract for Johnny Mitchell 1 International Paper Co., new wildcat 1 mile northeast of Blue Lake field in Sabine Parish, west central Louisiana. Production will be sought in Rodessa.

Atkins & Pannell, Camden, Ark., are handling the contract for a new 3,000-ft. wildcat northwest of Elliott, Ouachita County, south-central Arkansas. The new try is W. J. Budd et al 1 A. F. Daniels in NW SW 28-14s-17w.

Davis & Davidson are contractors on a projected 4,500-ft. wildcat test which James G. McCarrick of San Antonio is starting 2 miles south of Goliad, in Goliad County, southwestern Texas. Objective is the Vicksburg formation.

when you use

GEOLOGRAPH

No need to step into trouble! You SEE formation changes, automatically recorded on Geolograph charts, foot by foot, as you drill! You get up-to-the-minute, accurate drilling data 24 hours a day. That's why you save when you log as you drill, with Geolograph.

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

Abilene, Houston, Odessa, Lubbock & Wichita Falls, Texas—Bakersfield, Calif.—Shreveport & Baton Rouge, La.—Casper, Wyoming—Gleadive, Montana—Sterling, Colo.—Farmington, New Mexico—Liberal, Kan.—Oklahoma City, Okla.

For Rod or Tubing Pumps

Reduce Your Cost
for
pump repairs and well pulling due to pump trouble

SAVE UP TO 80% UP TO $2500.00 per year on a SINGLE well

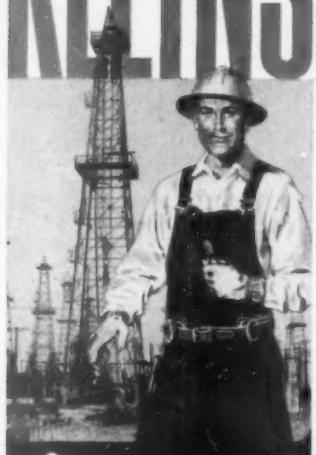
And it may not cost you a cent . . . for in many cases the MARTIN PLUNGER costs no more than the replacement of your present plunger. MARTIN CAGES, with their long life, synthetic rubber ball guides, protect balls and seats and increase savings. Ask almost anyone around Freer or Smackover, or Oklahoma City, or wherever hard pumping conditions are found.

Sold thru your supply company.

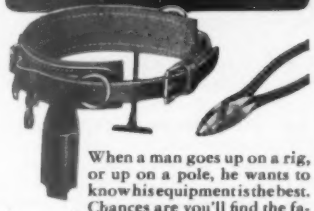
Field representatives:
E. W. Brockman, Tel. 7-7477, Tulsa
Don C. Davis, Tel. Wilson 8055, Ft. Worth
Tom Hulett, Tel. 3-4545, El Dorado, Ark.
L. K. Martin, Tel. 2-5317, Corpus Christi
J. L. Davis, Tel. MOhawk 4891, Houston

JOHN N. MARTIN
MANUFACTURER
9 W. Brady St., Tulsa, Okla. Tel. 4-9415

KLEINS



Quality A MAN CAN DEPEND ON



When a man goes up on a rig, or up on a pole, he wants to know his equipment is the best. Chances are you'll find the familiar Klein trade-mark on his safety strap and belt. And in his kit you'll find Klein pliers, lag wrenches and grips. For Klein is the quality line—the line a man can always depend on for safety and service.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide today!

"Since 1857"

Mathias KLEIN & Sons

Established 1857 — Chicago, Ill. U.S.A.

3200 BELMONT AVE. CHICAGO 18, ILL.

HEWITT-ROBINS

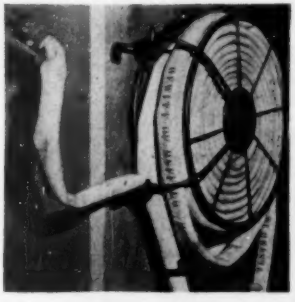
FIRST FOR HANDLING STEAM

Hewitt-Robins Steam Hose

You can be sure of longer, safer hose performance for your steam service with Hewitt-Robins Steam Hose. Because, Hewitt-Robins Steam Hose is designed to give you the longest possible service even under continuous temperatures up to 388°F and pressures up to 200 psi.

Hewitt-Robins Steam Hose comes in three types: Monarch® Fiberglas-Cord for extra-severe service where light weight and extreme flexibility are required . . . Maltese Cross® for those who prefer braided wire reinforcement . . . Ajax® for general, intermittent service at pressures up to 100 psi.

Get the complete story about Hewitt-Robins better Steam Hose: Call your Hewitt-Robins Distributor (see "Rubber Products" in classified phone book), or write for details.



FIRST FOR FIGHTING FIRES

Hewitt-Robins Fire Hose— Unexcelled For Over 80 Years

For the finest fire hose money can buy, always specify Hewitt-Robins Maltese Cross®, Monarch® (Underwriters specification) . . . or Ajax® Mill (General Service). They are unequalled for service, quality and safety.

Whatever your requirements for fire hose, you will find that Hewitt-Robins has the right hose to meet your needs . . . cotton-jacketed—rubber-covered chemical booster . . . each one is *first* in its class.

For complete fire hose facts: Call your Hewitt-Robins Distributor (see "Rubber Products" in classified phone book), or write for Bulletin H-2.

HEWITT-ROBINS HR **INCORPORATED**

STAMFORD CONNECTICUT

Hewitt Rubber Division — Robins Conveyors Division

Hewitt Restfoam® Division — Robins Engineers Division

Stop Hunting
CALL
FLINT STEEL
for
STRUCTURAL FABRICATING
WAREHOUSE PRODUCTS
REINFORCING FABRICATING
PLATE FABRICATING

FLINT STEEL
CORPORATION
TULSA MEMPHIS

OIL and GAS BURNING EQUIPMENT
for
PETROLEUM REFINERIES
Detailed Information Gladly Sent Upon Request
CHEMICAL-PETROLEUM DIV.
NATIONAL AIROIL BURNER COMPANY, INC.
1338 E. HEDLEY AVE. PHILADELPHIA 34, PA.
South Western Division: 2512 So. Blvd., Houston 6, Tex.

TO CHANGE YOUR ADDRESS

IT'S BEST . . .
to send your old address clipped from the Journal mailing envelope along with your new location.

ADVANCE NOTICE . . .
10 days before you move, and we guarantee you week-to-week undelayed service.

WRITE . . .
Circulation Department
THE OIL AND GAS JOURNAL
Box 1260 Tulsa 1, Okla.

REFINING

New Shale Unit

Bureau lets contract for more facilities at Rifle

DENVER.—The Bureau of Mines let a $288,980 contract last week to Blaw-Knox Construction Co., Pittsburgh, for construction and installation of a new pilot-plant retort and two oil-shale storage and distribution systems at Rifle, Colo.

The three-part contract calls for installation of (1) a gas-combustion pilot plant costing $107,920, (2) a $79,470 raw-shale storage and distribution system to serve all pilot-plant retorting facilities, and (3) a $101,590 raw-shale storage and distribution system for a demonstration-scale retort now under construction by the same firm.

The new pilot plant will be an improved version of an existing unit that has proved the continuous process to be the most efficient and most economical yet developed for extracting oil from the Colorado Shale, according to Boyd Guthrie, chief of the bureau's oil-shale demonstration branch.

It will be used as a flexible unit for rapid testing of process variables and solving problems arising in operating the larger plant. Capacity of the unit will be 25 tons of shale per day.

Preliminary dismantling and altering work will begin immediately, and the new plant should be ready for operation in about 6 months if materials and equipment come through on schedule, Guthrie said. Initial test run of the larger unit (capacity: 150 to 300 tons of shale daily) should be made late this summer or in early fall.

Objectives . . . The demonstration retort, Guthrie said, will be used to (1) determine cost and yield data that will permit an accurate evaluation of the gas-combustion retorting process; (2) provide the technical information needed by industry to design commercial plants; and (3) to supply crude shale oil in quantities required for the bureau's refining studies.

A 10-day demonstration run, requested by the National Petroleum Council's committee on synthetic-liquid-fuel costs, was completed recently and witnessed by the NPC oil-shale-processing subcommittee.

Guthrie said the test was run primarily to determine whether the 6-ton unit was capable of sustained operations at high efficiency and a rapid retorting rate when charging shale as rich or a little richer than the average grade that would be processed in an industrial operation.

Shale charged during the run assayed 29 gal. of oil to the ton, and particle size ranged from ¼ to 1¼ in. Guthrie said no difficulties were encountered, and a "good yield was obtained at a high throughput or retorting rate." Average yield for the 10 days was 94.1 per cent of the Fischer assay value of the shale. Average retorting rate was 233 lb. per hour per square foot of retort cross-sectional area.

Military-Fuels Committee To Discuss TEL Situation

SAN FRANCISCO.—Discussion of the order restricting use of tetraethyl lead, a review of the tetraethyl lead reserve-stock program, and a review of the avgas-supply situation will make up part of the agenda of the first meeting here this week of the Military Fuels General Advisory committee to the Petroleum Administration for Defense, according to Bruce Brown, deputy administrator.

Programs and policies of PAD's refining division with respect to material allocations and accelerated tax amoritization of construction of new facilities also will be discussed with the committee, Brown said.

Recommendations recently made to PAD by the Military Fuels Technical Advisory committee will be reviewed.

William W. Keeler, director of PAD's refining division, is chairman of MFGAC, and Maurice F. Granville, assistant director of the refining division, is secretary.

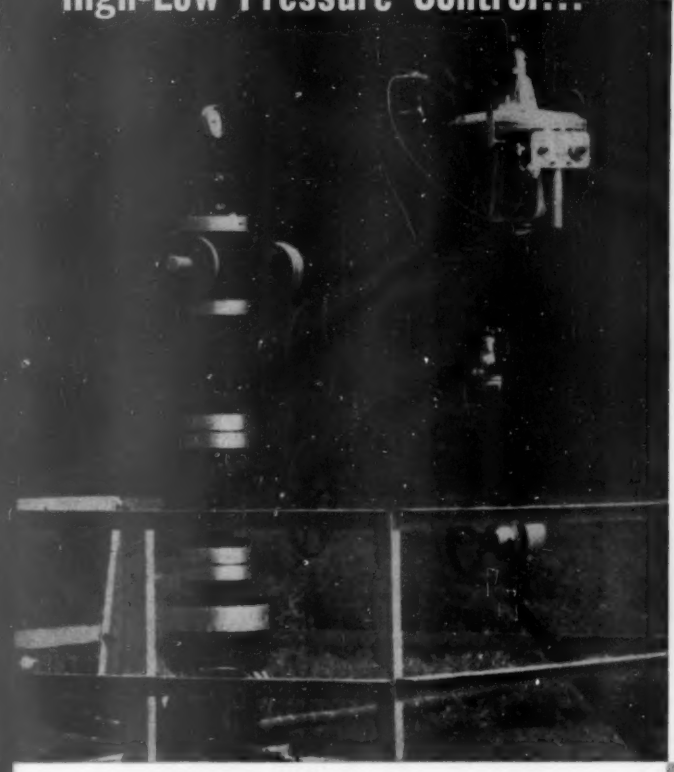
New Lube-Oil-Designation System Approved by A.P.I.

TULSA.—A revision of automotive lubricating-oil designations recommended by the lubrication committee and division of marketing of the American Petroleum Institute has been approved by the A.P.I. board of directors.

The new system, also endorsed by a special panel of the American Society for Testing Materials during preliminary studies and by the automotive industry has no relation to the present SAE numbering system, which will be continued as is.

B. G. Symon, Shell Oil Co., head of

For More Dependable, Accurate High-Low Pressure Control...



BS&B Type 1401 High-Low Pressure Pilot on high pressure well in a Louisiana field.

Specify

BS&B

Climax • Type 1401

HIGH-LOW

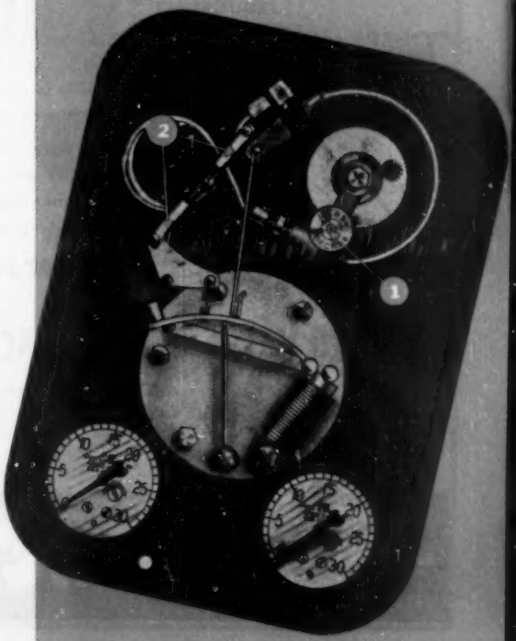
PRESSURE PILOT

The Type 1401 Pressure Pilot was developed to normally control reduced pressures on gas flow lines and also provide a *"Safety Shut Off"* in case of a line break. It operates as a pressure controller up to the limits of its Bourdon tube, but can also be set to close the valve at a pre-set "low pressure" for LOW PRESSURE CUT-OFF SERVICE.

SIMPLE ADJUSTMENT • POSITIVE CONTROL (1) The high pressure setting on the Type 1401 Pilot is obtained by means of the knob adjustment on the Bourdon tube. (2) Low pressure setting is obtained by means of a turnbuckle which locks into place. The Type 1401 High-Low Pressure Pilot can only be used with a reverse acting "AIR TO OPEN" valve.

MANY APPLICATIONS POSSIBLE The Type 1401 Pilot can be used for control of vacuum, reduced pressure, pump discharge pressure, maximum-minimum (on-off) control.

FREE ENGINEERING SERVICE • NO OBLIGATION
If you have a control problem, let BS&B Climax Controls Engineers help you solve it. The Type 1401 High-Low Pressure Pilot is just one of the many controls designed, engineered and precision-built by BS&B to meet your specific needs. Write for the complete Climax catalog.



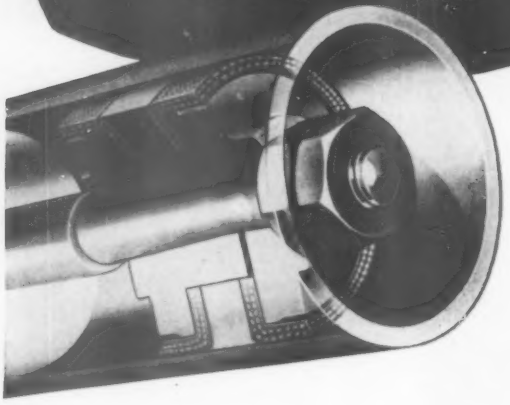
TYPE 1401

BS&B CLIMAX CONTROLS

BLACK, SIVALLS & BRYSON, INC.

Climax Controls Division, Dept. 4-A5
7500 East 12th Street Kansas City 3, Missouri

YOU GET
higher efficiency
WITH DARCOVA PUMCUPS
ON THE JOB!



THERE are two basic, well-proved reasons why more and more Darcova Pumcups are going into cylinders of air and hydraulic controls and mechanisms.

First, texture-engineered Pumcups outlast most other piston packings at least 3 to 1. There's less replacement, less down-time!

Secondly, efficiency *does not diminish* as Pumcups wear. Response is always faster, surer, with less power consumed!

Darcova Pumcups are available in sizes and engineered textures ideal for virtually any service. Why not find out what they can save *you?*

ASK FOR BULLETIN No. 4502

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

the lubrication committee, said that informational and educational material on the new designations will be discussed and prepared at a committee meeting here May 26-27.

The new system was developed to cope with recent automotive developments—especially those which lead to the introduction and use of several graduations of heavy-duty lubes.

The revisions:

1. Definite types of service requirements (based on operating conditions), engine design, and fuel type instead of specifying oil composition, and assign simple, nondescriptive identifying marks for oil meeting such types of service.

2. Leave each oil company (with individual responsibility) free to develop and market the type of oil which that company feels is most suitable for each service application.

3. By throwing out "heavy duty" type, remove an implied requirement that to be suitable for gasoline-engine service an oil must necessarily be suitable for diesel-engine service.

4. Replace completely the present obsolete and confusing designations.

5. Provide a system which can survive changes in equipment design and which encourage developments and changes in oil composition when changes occur in service requirements.

Refinery Worker Draws Top Pay in Texas During March

AUSTIN.—Oil-refinery labor drew the top average daily wage among industrial workers in Texas for March, the Texas Employment Commission reported last week.

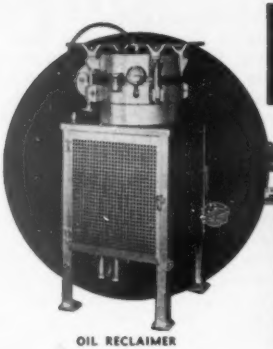
The average refinery hand drew an $84.23 pay check for a 40.3-hour week—this figures out at $2.09 hourly and is 63 cents more than the corresponding pay check for a week in February.

The refinery worker earned 7 cents more per hour than oil-production labor ($2.02) and 56 cents hourly more than the average for Texas factory hands in general ($1.53).

Deep Rock Plant Progressing

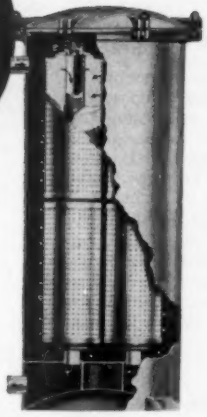
CUSHING, Okla.—Construction of a modern lubricating-oil blending and packaging plant at Deep Rock Oil Corp.'s refinery here is nearing completion, and the plant is expected to be in operation before the end of June.

Meanwhile, ground has been broken at Cushing for Deep Rock's new $2,000,000 lube-oil manufacturing plant, which is expected to be completed in the early part of 1953.



OIL RECLAIMER

HILCO LUBE and FUEL OIL PURIFICATION - - -



FILTER

15 YEARS CONTINUOUS OPERATION WITHOUT OIL CHANGE IN DIESEL AND GAS ENGINES—NEGLIGIBLE PISTON AND CYLINDER WEAR.

THIS IS THE RESULT OF COMPLETE PURIFICATION—THE REMOVAL OF SLUDGE, CARBON, ACIDS, WATER, AND FUEL DILUTION.

HILCO UNITS IN OPERATION LONG ENOUGH TO PROVE THEIR VALUE. ONE-QUARTER CENTURY OF EXPERIENCE IS AT YOUR SERVICE.

- PURIFIERS
- FILTERS
- RECLAIMERS
- CONDITIONERS

THERE IS A HILCO FOR EVERY LUBRICATION AND FUEL OIL FILTERING PROBLEM - - -

YOU WANT CLEAN OIL AND CLEAN ENGINES TO SAVE EQUIPMENT—OIL AND MONEY—INVESTIGATE HILCO OIL MAINTENANCE METHODS.

★ **WRITE FOR FREE LITERATURE - - NO OBLIGATION**

THE HILLIARD CORPORATION, 23 W. FOURTH STREET, ELMIRA, N. Y.

IN CANADA—UPTON-BRADEEN-JAMES, LTD., 990 BAY STREET, TORONTO, 3464 PARK AVE., MONTREAL

DO YOU FURNISH HOUSING AND FEEDING FACILITIES FOR YOUR *REFINERY AND CONSTRUCTION CREWS?*

INTERSTATE BEDDING COMPANY IS YOUR *ONE COMPLETE SOURCE* FOR ALL OF YOUR HOUSING AND FEEDING NEEDS!

FOR SALE or FOR RENT

Interstate Bedding Co. can furnish you with the proper housing and feeding equipment for your workers—no matter how large or small a number . . . no matter where they are located . . . no matter what the climatic conditions! Interstate Bedding Co. manufactures practically all of their own equipment—assuring you of the fastest service at the lowest costs. *Interstate's equipment is available to you on a Rental basis . . . or for outright sale.*

INTERSTATE BEDDING CO. CAN SUPPLY YOU WITH:

- HOUSING—Tents: 2-man, 4-man, 8-man, and Field Tents.
- BEDDING—Comforters, Canvas Cots, Steel Cots, Blankets, Sleeping Bags, Double Deck Bunks, Sheets, Mattresses, Mattress Covers, Pillow Cases, Straw Ticks, Towels.
- FEEDING EQUIPMENT—Field Stoves, Cooking Utensils, Serving and Flat Ware, Refrigeration.
- TABLES • CHAIRS • WASH BASINS.

24 HOUR SERVICE — WRITE • WIRE • PHONE

INTERSTATE BEDDING CO. Dept. M

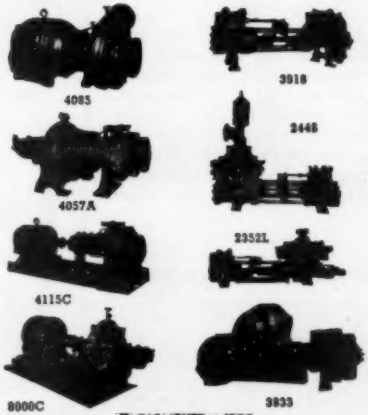
1621 W. Carroll Ave., Chicago 12, Illinois

Phone: CHesapeake 3-4660

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W. TENTH ST.

NATURAL GAS

Texas Eastern Applies for Whopping Rate Increase

WASHINGTON. — An application for a $40,000,000 annual increase in wholesale natural-gas rates, the largest ever proposed to the Federal Power Commission, has been filed with FPC by Texas Eastern Transmission Corp., Shreveport.

The 37 per cent hike in rates would affect about 40 wholesale customers including operating companies of the Columbia and Consolidated gas systems. It would take effect June 1 this year.

Texas Eastern's system originates in Texas and extends through Louisiana, Arkansas, Missouri, Mississippi, Illinois, Tennessee, Kentucky, Indiana, Ohio, West Virginia, Pennsylvania, New York, and New Jersey.

The company said the increase is necessary due to higher construction costs, higher operating costs, and increased state and federal taxes. The proposal is now under study by the commission's staff.

Also filed with the commission on the same day, May 1, were proposed increases in rates by three Columbia Gas System subsidiaries and by Mississippi River Fuel Corp. for $5,900,000 and $3,400,000, respectively. This brought the total in the one day to more than $49,000,000. The total increase proposed in all applications filed with FPC to date is more than $137,000,000.

The Columbia subsidiaries and proposed rate hikes are Ohio Fuel Gas Co., Columbus, $2,200,000 Manufacturers Light & Heat Co., Pittsburgh, $2,200,000; and Home Gas Co., also of Pittsburgh, $1,500,000. The first two firms buy gas from Texas Eastern, while Home buys from Manufacturers. All the increases would take effect June 1.

McCarthy Firm Changes Name

HOUSTON. — McCarthy Chemical Co. has changed its name to Texas Gas Corp., Russell M. Riggins, president, revealed last week.

Riggins said the new name more clearly reflects actual activities engaged in by the company and will avoid possible confusion with other firms having similar names.

The company is engaged in purchasing, processing, and distributing natural gas, operates several hundred miles of gas lines on the Gulf Coast, and maintains three large plants for processing gas and manufacturing chemicals.

Hugoton System Completed

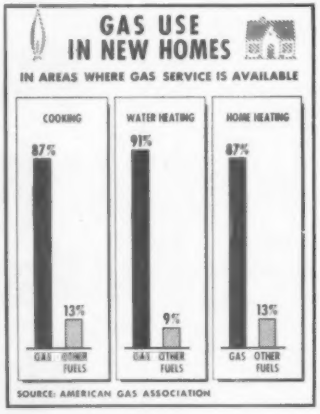
HUGOTON, Kans.—Northern Natural Gas Co. recently completed its new Hugoton field gas-gathering system featuring a new compressor station near here equipped with vertical engines, first on the Northern Natural network.

The station, located about 10 miles east and 1 mile north of Hugoton, contains ten 1,320-hp., 800-r.p.m. vertical engines driving banks of compressors. It handles about 200,000,000 cu. ft. of natural gas per day from about 400 wells.

Price Protest to be Aired

WASHINGTON.—A hearing is scheduled to get under way here this week on protests by Continental Oil Co. and Stanolind Oil & Gas Co. against an Office of Price Stabilization order setting a ceiling price of 10 cents per M.c.f. on gas from Woodlawn field of Harrison County, Texas.

Conoco and Stanolind are seeking a ceiling of 12 cents per M.c.f. in the field.



Gas Use Gaining

Wide acceptance of gas and gas appliances in new homes built in the United States within gas-company franchise areas is shown graphically in this chart. In these areas more than 95 per cent of single and multifamily dwellings used gas for one or more purposes.

Spencer Building New Type Of Ammonia-Production Unit

VICKSBURG, Miss. — Spencer Chemical Co. has revealed plans to include at its $15,000,000 plant now under construction here facilities for production of anhydrous ammonia by partially oxidizing natural gas with oxygen.

The plant will produce about 200 tons of ammonia daily with the oxidation process, the first time it has been used as the basic process in making ammonia.

Contracts have been awarded to Air Products, Inc., Allentown, Pa., to design, manufacture, and install key equipment at a cost of more than $1,000,000. These facilities will extract 180 tons of oxygen and 310 tons of nitrogen per day from the air.

The oxygen is combined with natural gas, and hydrogen (one of the first reaction's products) is added directly to the nitrogen to form ammonia.

Spencer officials say production costs will be at least 6 per cent lower than with alternative processes.

Natural Gasoline

Magnolia Plans Underground Propane Storage in Texas

AUSTIN.—Magnolia Petroleum Co. has revealed plans to store propane via a single gas well in Zone 21-A, Seeligson field, Jim Wells and Kleberg counties, Texas.

In a hearing before a Texas Railroad Commission examiner, Thomas Walker, Magnolia geologist, said that the company planned to store surplus propane through perforations from 6,604 to 6,622 ft., in its No. 18, a gas producer and the only well completed in a closed reservoir. The propane would be reproduced with the gas during periods of heavy demand.

L.P.G. Group Reconstituted

NEW YORK.—Frank M. Porter, president of the American Petroleum Institute, has announced reconstitution of the organization's committee on liquefied petroleum gas.

The new committee will undertake development of standards for L.P.G. installations at marine and pipe-line terminals, natural-gasoline plants, refineries, and tank farms.

George R. Benz, Phillips Petroleum Co., Bartlesville, has been appointed chairman of the 55-man committee, and E. O. Mattocks, A.P.I., New York, is secretary.

Equipment with *Engineering* Service

Ref: 1924
Peerless
6"
2" 3000# couplings
1000 psig WP API-ASME Code
6" nozzles w/600 ASA flanges
Max. flow 13,000,000 SCFD
P min - 825 psig
T max - 80°F
Gas Sp Gr = 0.75 (Air = 1.0)
13,000,000 / 24 SCFH (Fsg)(Ft) = Equiv Flow
(Base = 0.69 sp gr & 60° F)
542,000 SCFH (1.04)(1.02) = 574,000 SCFH Equiv
From Peerless Chart for Line Separators
Capacity 6" Line Separator @ 750 psig - 554,000 SCFH
Capacity @ 825 psig = 554,000 √(825+15)/(750+15) = 580,000 SCFH
Recommend: Type 6E Peerless Line Separator
API-ASME Code construction
for 1000 PSI @ 100°F

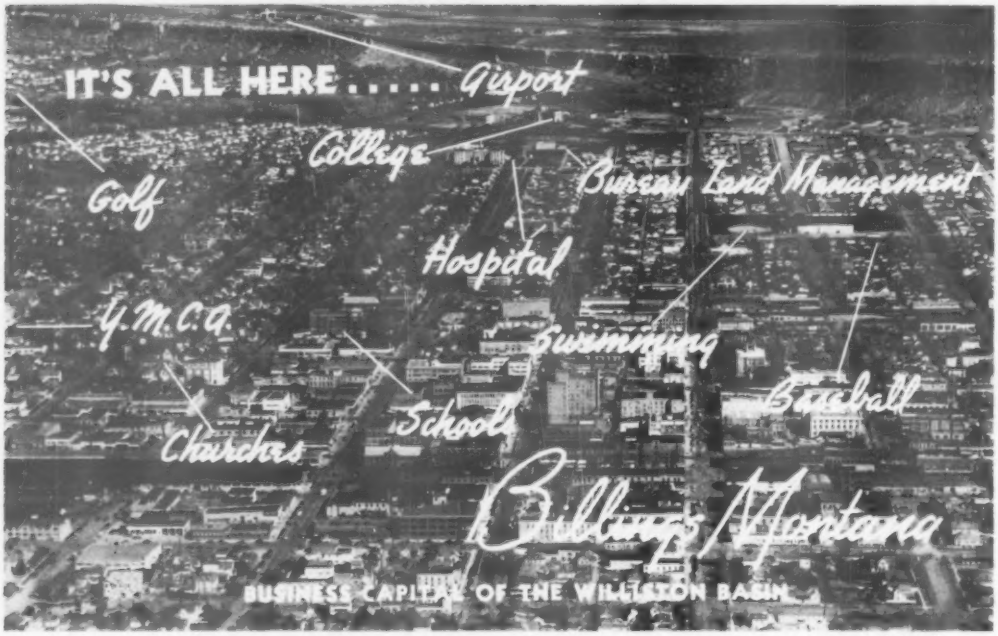
MECO

MAINTENANCE *Engineering* **CORPORATION**

P. O. BOX 2637

3711 CLINTON DRIVE
HOUSTON, TEXAS

YOU'RE INVITED TO BILLINGS, MONTANA



Roubert Photo

IDEAL HOME FOR
WILLISTON BASIN PRODUCTION OFFICES

CHECK THESE ADVANTAGES

- Land records for Montana, Wyoming, North and South Dakota, Kansas and Nebraska located Bureau of Land Management, headquarters in Billings.
- Office of Chief Geologist Northern Pacific Railway Company.
- Airlines. Frontier Airlines, Northwest Airlines, and Western Airlines.
- Railroads. Chicago, Burlington & Quincy, Great Northern and Northern Pacific.
- Most major oil companies now have representative offices in Billings.
- Adequate financial institutions. Four banks—Billings State Bank, the Midland National Bank, Montana National Bank and Security Trust & Savings Bank.
- Ample hotel facilities.
- Living and recreational conditions are ideal.
- Billings has all the features of a modern city.
- Enjoy fishing the nearby streams or mountain lakes.
- Unsurpassed scenery an hour's drive from Billings.

LOTS OF GOOD FISHING WATER NEAR BILLINGS

For further information — Write, Wire or Phone

THE BILLINGS COMMERCIAL CLUB

P. O. Box 2099 (Chamber of Commerce) Billings, Montana

Stimulants for Delaware Basin Area

THE potentialities of the Lower Permian and pre-Permian rocks of the Delaware basin and the Sheffield channel of southwesternmost Texas have been recognized ever since oil was found in time-equivalent rocks in West Texas; but it has been only in recent weeks that there has been sufficient verification of these potentialities to inspire a concerted search for oil.

The reasons why this volume of attractive rocks was neglected are obvious: (1) The sparsely settled area was just beyond the accepted limits of marketable-oil areas. (2) The area was found extremely difficult to work by either geological or geophysical methods because the Permian beds mask all evidence of traps at depths and the great velocity contrasts in these thick-lying beds prevent adequate penetration of shot energy. (3) At the time of the development of shallow production, holes deep enough to get through the evaporite-laden Permian in the deeper parts of the basin were considered impossible.

The reasons why this area has been getting more and more attention in recent months are just as obvious. (1) The area is no longer considered too remote as evidenced by the already-tightening lease situation. (2) Though the area is just as difficult to work as it ever was, seismograph crews now in the basin are gradually whipping their problems by improved instrumentation and techniques. (3) The deep holes required to penetrate the Permian and get into the older Paleozoics are becoming commonplace in this country and the problems of drilling the evaporite beds have been mastered. In summary, operators have got to go somewhere and the Delaware basin is one of those places.

The locations of the wells that have stimulated interest in the Delaware basin area are shown on the sketch map, which angles across the southeastern portion of the Delaware basin into the Sheffield channel. Limited drilling has shown that the Sheffield channel connected the Midland and Delaware basins at various times during geologic

history. This seaway ran around the south end of a buried foreland range known as the Central Basin platform where basement rocks are found within 2,000 ft. of sea level in contrast to their present position in the Delaware basin of 17,000 ft. below sea level.

The first positive indication that the deeper rocks in the Delaware basin contain hydrocarbons in quantities sufficient to make expensive exploratory work and deep drilling worth while was at M. A. Grisham 1 Grisham fee, A on map, which flowed dry gas at estimated rates as high as 60,000 M.c.f. daily through 2-in. line. Production is from pre-Permian rocks (Pennsylvanian, Mississippian, or Siluro-Devonian) at 9,032-54 ft.

At a distance of about 135 miles to the southeast, which would be a long way away anywhere except in West Texas, is Phillips Petroleum Co. 1 Glenna, B on map. Phillips is still not ready to release any information on the results of a drill-stem test which unconfirmed reports say produced gas and distillate from a 125-ft. interval beginning at 13,800 ft. in the Ellenburger. The interest in what this well must have found reached a high pitch when Phillips recently staked locations for four deep (15,000-ft.) Ellenburger tests within an area of 2 miles to the north and northwest of the 1 Glenna.

The Delaware basin has yielded only small quantities of oil, all from shallow Permian sands, but an era of deep drilling to Permian-Wolfcamp and pre-Permian reservoirs, where the big oil is expected to be found, appears to be unfolding. *Philip C. Ingalls.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MONTANA.—Shell Oil Co. has established the biggest Williston basin producer to date in the Cedar Creek area of Dawson County, Montana, with other apparent successes in the making along the Baker-Glendive anticline.

TEXAS GULF COAST.—Magnolia Petroleum Co. has prospects of completing the deepest producer on the Texas Gulf Coast at 1 Carl Reynolds, 2¼ miles north of New Taiton field production. On test of perforations at 13,800-44 ft., using ¼-in. chokes, well developed 1,200 psi. working pressure at surface and showed recovery of 800 ft. of gas-cut mud, heavily cut with gas.

COLORADO.—The first oil discovery in Washington County is indicated at Kimbark Co. 1 Ward, wildcat in the central part of the county, after operator recovered 2,525 ft. of oil and 75 ft. of water on drill-stem test of the "J" sand.

NEBRASKA.—Vaughey & Vaughey 1 Goodwin, Goodwin area, Kimball County, pumped 262 bbl. of oil daily with no water on completion tests in the "J" sand, for another successful discovery in the increasingly active Denver-Julesburg basin.

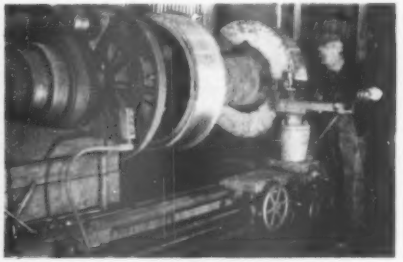
GREAT SERVICE IN GREAT BEND

C & W MACHINE WORKS FEATURES COMPLETE Wilson SERVICE!

C & W is another link in a strong chain of *factory trained* and *completely equipped field shops* throughout the oil country, which service *Wilson Rigs and Winches.* C & W is staffed by men who have grown up in the business. For example, Bob Craine and Floyd Cailloux, owners, are really "OL' TIMERS." If you don't already know them, they'll certainly make it a point to get around and see you! In addition to the Great Bend plant, another C & W Machine Works is located at Plainville, Kansas. Yes, for Wilson service in Western Kansas, you'll find C & W Machine Works on the job, ready to give you faster and more complete service. Another reason why *Wilson is always your best buy!*

C & W prides itself on the fact it has "the best darn machines in the business." They really know how to service those Wilson Rigs and Winches!

THE NEW WILSON ATLAS RIG



Huge lathes, such as the one above, and other precision equipment handle the heaviest repair or overhaul job on Wilson Rigs and Winches.

Congratulations to Jarecki International

Wilson MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

Southwest Texas

New Oil Pool Opened In San Patricio County

CORPUS CHRISTI.—A new oil pool has been opened 2 miles northwest of Mathis, San Patricio County, at Charles A. Daubert and Walter Achning 1 F. B. Frels, located in Block 8, Schliecher & Joseph subdivision of M. P. & J. N. Delgado Grant, Abstract 4. From perforations at 4,706-08 ft., the well flowed at the rate of 34 bbl. of oil daily through 5/64-in. choke. Hole is bottomed at 4,848 ft. with 5½-in. casing cemented at 4,770 ft. This venture is located 3,600 ft. south of 1 A. Soehnge, gas discovery well.

In Wilson County, M. L. Wise 1 E. Hayden, outpost to Higgins-Borrego field, is waiting on casing after recovering 3,420 ft. of oil and oil-cut mud on a drill-stem test. On 30-minute test at 5,774-5,814 ft., using ¼-in. chokes, maximum flowing pressure was 1,650 psi. and recovery was oil from the Buda lime. Shut-in pressure was 2,800 psi. Well is located in David F. Webb Survey.

Lone Star Producing Co. 1 Mrs. Juan Leal, Atascosa County wildcat 9 miles southeast of Pleasanton, flowed 77 bbl. of 56°-gravity distillate per day and 1,830,000 cu. ft. of gas from the Edwards lime at 8,142-53 ft. Operator is continuing to test at this prospective venture, which is located in J. A. Guiterrez Survey 1059.

C. G. Glasscock has a prospective discovery at 1 C. G. Glasscock Fee, wildcat 15 miles southeast of Realitos in Duval County. Operator recovered 150 ft. of oil on a drill-stem test at 2,985-3,030 ft. Hole is bottomed at 4,147 ft. with 5½-in. casing cemented to 3,300 ft. Location is in Santa Cruz de la Concepion Francisco Cordente Grant, Abstract 173.

Jim Hogg County has a new oil discovery 4 miles southwest of Cuevitas at Armstrong & Cotton 3 Downs Royalty Corp. Completion was made from open hole at 2,329 ft., where 5½-in. casing was set, and 2,333 ft., the total depth. The well pumped 20 bbl. of 34.7°-gravity oil per day. Location is in Block 51, Beer and Coffey subdivision of El Javali Grant.

Two offsets have been completed to the new Howell-Vicksburg field in San Patricio and Jim Wells counties. H. H. Howell 1 Walter Brumme, 800 ft. west of his new discovery, has been finaled for 87 bbl. of 40.5°-gravity oil through 3/16-in. choke. Production is from perforations at 5,254-59½ ft. Across the Nueces River in San Patricio County, J. W. Gorman 2 B. W. Cox flowed 133 bbl. of 40°-gravity oil through ¼-in. choke from perforations at 5,255-59 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: gas discovery—Appell Drilling Co. 3 J. L. Dornak, John Gaston Sur., 1245, 6 mi. SW of Jourdanton, TD 1,449 ft., Queen City 443-49 ft., IP 280,000 cu. ft. of gas per day, ¼-in. choke.

Duval County: oil discovery—Salt Dome Production Co. at al 1 Matilde Martinez, Marcelino Arreola Sur. 64, A-1521, TD 4,696 ft., perf. 3,596-3,603 ft., IP gas well, no gage.

Hidalgo County: gas discovery—Taylor Refining Co. & Mayfair Minerals, Inc., 1 Pablo Espara et al unit, Steele & Pershing Subd., Lot 1 & Blk. 17, TD 8,250 ft., perf. 6,893-6,910 ft., IP 5,980,000 cu. ft. of gas per day.

Jim Wells County: new pay at Bailey—Southwestern Oil Co. 2 Eva Coopwood, Richward King Farm Lots, Sec. 17, Blk. B, IP 135 bbl. oil per day, 37° gravity, TP 1,100 psi., new pay 5,403-09 ft., flowed gas, no gage, CP 2,100 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Union Producing Co. 7 Virginia H. Tatton, John Durst Sur., A-51, dry, TD 11,515 ft.

Bastrop County: Wolff & Rahal 1 Oscar Fisher, J. Adair Sur., dry, TD 2,850 ft.

Dimmitt County: Howeth & Mason 3 George E. Light, Sec. 66, I&GN RR Sur., A-528, dry, TD 5,850 ft.

Hidalgo County: Taylor Refining Co. 2 A. A. McAllen, Santa Anita Grant, dry, TD 9,576 ft.

Jim Hogg County: Harold K. Boysen 1 R. Hinnant, Las Animas Grant, Share 1, Blk. 3 and 4, dry, TD 2,089 ft.

Tri-Mark Oil Co. 2 Julian Vela Pena, El Peyote Grant, Geo. W. Rose Sur., 588, Blk. 55, dry 2,916 ft.

Jim Wells County: Cypress Oil Co. 1 J. M. Canáles, Los Tramojos Grant, dry, TD 6,015 ft.

LaSalle County: James M. Anderson 1 A. E. Schletze, L. W. Rabb Sur., A-1769, dry, TD 5,315 ft.

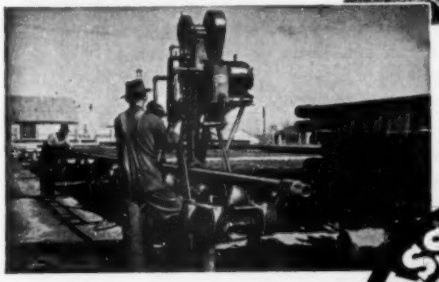
Milam County: D. H. Bolin 1 R. L. King, J. M. Matlock Sur., dry, TD 4,063 ft. Grenn Bros. 1 R. F. Lindhorst, Jose Acosta Sur., dry, TD 1,384 ft.

DRILL PIPE FOR RENT

No need to tie-up operating capital in drilling equipment! Just call "Associated"! Drill pipe and tools are maintained in excellent condition, ready for immediate delivery on rental basis. All six yards (listed below) are equipped to give you fast 24-hour service!

ALSO
- DRILL COLLARS
- KELLYS
- KELLY DRIVE BUSHINGS
- CORE BARRELS
- SAFETY JOINTS
- ROTARY SLIPS
- BLOWOUT PREVENTERS
- ROTARY TONGS
- ELEVATORS
- ROTARY SUBS

(*Right*) All pipe returned to our yards is steam cleaned and rigidly inspected.



(*Left*) Returned pipe is straightened, repaired to first class condition and threads properly lubricated before being replaced on racks.

MAIN OFFICE — HOUSTON, TEXAS

HOUSTON, TEXAS
Phone CApitol 9596

CASPER, WYOMING

ODESSA, TEXAS
Phone 2331

NEW IBERIA, LA.
Phone 1553-J

HARVEY, LA.
Phone UPtown 8585

ASSOCIATED A OIL FIELD RENTALS INC.

Nueces County: Seaboard Oil Co. 1 William Singer Est., Flour Bluff & Encinal Farm & Garden Tracts, Sec. 38, Blk. 4, dry, TD 7,520 ft.

San Patricio County: Gravis & Mitchell 1 Walter Leber, San Patricio de Hibernia Grant, A-30, dry, TD 6,510 ft.

Starr County: Continental Oil Co. A-126 T. B. Slick, Sec. 231, dry, TD 5,104 ft.

Jay Simmons 2 Virginia Chapa de Vela et al, Porcion 91, Share 2-A, dry, TD 4,533 ft.

Val Verde County: Ted Harris 1 Cam Langley, TCRR Co. Sur., 741, A-1424, dry, TD 2,109 ft.

Webb County: James C. Freeman 1 Floyd Billings et al, Sur. 34, dry, TD 2,372 ft. Sid Katz et al 1 J. E. Long, LI&AA Sur., 1009, dry, TD 2,774 ft.

O. W. Killam 5 Puig Bros., Edgington Subd. of Albercas Grant, dry, TD 2,246 ft.

Louisiana-Ark.

Caddo Wildcat Reports Kilpatrick Shows

SHREVEPORT.—Roberts & Smith have set production string and will test 1 Hunsicker, 15-20n-15w, Caddo Parish, about 2 miles west of Rockpoint field. The wildcat had shows of pay at 3,673-85 ft. and 3,710-16 ft. in the Kilpatrick sand, the producing formation for the one-well Rockpoint field. The well was drilled to 3,720 ft.

Two confirmation tests for Rockpoint field, both offsets to the discovery well, have shown Kilpatrick production but neither has been officially completed or gaged.

H. L. Hunt et al found lower sand containing 24 ft. of saturation at 1 C. F. Farrar, 1,887 ft. from south line, 1,969 ft. from east line in Section 4-6n-7e, first confirmation attempt in Ross Bayou field of Concordia Parish, after missing the pay productive in the discovery well. Hole is bottomed at 6,000 ft. and crews are running 7-in. production casing.

The 1 Farrar is the east offset to Serio Drilling Co. 1 Burrell, C NE SW 4-6n-7e, discovery well of Ross Bayou field, which is productive from sands at 5,086-5,113 ft.

Operators have set protection string at Southwest Gas Producting Co., Inc., and W. Feazel 1 Redwine, 1,675 ft. from north line, 685 ft. from west line in NE Section 11-17n-3w, wildcat 3½ miles east of Simsboro field, Lincoln Parish. The hole is bottomed at 10,086 ft. The well kicked while being cored at this depth and cement plug was set on bottom to bring it under control. Pipe stuck while pulling out and a fishing job followed. When pipe is set operators will cut out plug and continue drilling. The projected depth of the hole is 10,500 ft.

Arkansas.—Production string has been set at Curtis Kinard 1 Taylor, C SE NE NW 28-18s-12w, indicated discovery north of Strong in eastern Union County. Production is assured by drill-stem test from Smackover lime and indicated by side-wall samples from Cotton Valley sands.

A 15-minute drill-stem test in Smackover Porosity at 6,388-6,400 ft. recorded top pressure of 125 psi., using ¼-in. top choke and ⅝-in. bottom chokes. Recovery was estimated as 6,000 ft. of oil and gas and 170 ft. of salt water. After running log to total depth of 6,402 ft., operator took side-wall samples.

The following geological markers were from log and picked from samples. Log top of the Cotton Valley was 4,140 ft. Following sample tops were called, Buckner 6,340 ft., Smackover 6,385 ft., and Porosity 6,393 ft.

The new indicated discovery is about ¾ mile west of the depleted discovery well of old Strong field, which produced 28,000 bbl. before depletion.

W. G. Skelly cemented core barrel on bottom, cut pipe, and has plugged back and set production casing to test zones above 7,200 ft. at 1 Dickson heirs, in 36-19s-27w, southeastern Miller County. Operator was unable to recover fish at 11,076 ft. Hole was plugged back to 7,200 ft. and 7-in. casing set at this depth.

A small dry gas well has been completed near Harmony in Johnson County, northern Arkansas, by Big Chief Drilling Co. and Pure Oil Co. at 3 Low Gap unit in 30-11n-24w. Pool opener has a calculated open flow of 700,000 cu. ft. of gas daily from Atoka at 1,338-1,560 ft. open hole.

LOUISIANA WILDCAT FAILURES

De Soto Parish: R. P. Bufkin et al 1 G. H. Harris, 330 ft. N and 1,670 ft. W SEc NE 6-10n-13w, dry, TD 1,956 ft.

Ouachita Parish: W. O. Feazel et al 1 Louisiana Baptist Orphanage, C SE SW 22-18n-5e, dry, TD 8,768 ft.

ARKANSAS WILDCAT FAILURE

Ashley County: Lion Oil Co. 3 Crossett Lumber Co. "A," 525 ft. S and 490 ft. E NWc NE SE 11-18s-6w, dry, TD 3,512 ft.

When it is necessary to move from an old lease don't leave your investment in housing behind. Leave no ghost town of crumbling houses and buildings.

Use STURDYBILT Prefabricated, *Movable* houses. Then you can take your investment in housing with you to an active location.

Investigate STURDYBILT Prefabricated buildings before you buy *any* oil field housing.

Manufacturers of Special Millwork

Distributors of Johns-Manville Building Materials

Curtis Woodwork

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

Permian Basin

Andrews Strike Finishes With High Flow Potential

MIDLAND.—Phillips Petroleum Co. 1-EE University, Ellenburger discovery in Section 17 of Block 12 field of Andrews County, finished with a high flowing potential, after logging 360 ft. of pay section.

Completion potential of 1,498 bbl. of oil was based on an 8-hour flow of 499.4 bbl. through ½-in. tubing choke, from perforations between 10,884-918 and 10,938-978 ft. Top of the Ellenburger was 10,665 ft., and minus 7,384 ft., with only a few breaks in the pay to salt water at 11,065 ft.

The 1-EE University also indicated production from the Devonian on a drill-stem test at 8,260-8,360 ft. The field's only other producer from that formation lies to the northwest, in the northeast corner of Section 18.

On the other side of the county, Magnolia Petroleum Co. had an Ellenburger discovery looming at its 1 University, 17-8-University Lands. A drill-stem test in the Ellenburger at 13,850-68 ft. had flowing oil in 45 minutes, then gaged 54 bbl. of 46°-gravity oil the first hour and 72 bbl. the second hour. Open flowing bottom-hole pressure was 4,955 psi. and 15-minute shut-in pressure gaged 5,500 psi. A previous test at 13,828-50 ft. developed 2,500 ft. of clean oil. This well also had flowing oil in the Devonian from 12,554-72 ft.

Continental Oil Co. 1-8 University, also in Eastern Andrews County in Section 8, Block 7, recovered water blanket and drilling mud on a drill-stem test in the top of the Devonian from 12,572-606 ft. It was drilling ahead.

Continental staked locations for two extension tests in Elkhorn-Ellenburger field of Crockett County. Its 21-A Shannon, in 21-UV-GC&SF, is ½ mile north of production, while the 20-A Shannon in Section 23 is a southwest offset to a producer in the south end of the field.

Humble Oil & Refining Co. 1 Ivy Heugler, Spraberry wildcat in 33-36-T5S-T&P, extended the main portion of Driver field approximately 2 miles east in Glasscock County. The well completed flowing 203 bbl. of oil a day through 24/64-in. choke, from perforations at 7,635-7,700 ft.

Mid-Continent Petroleum Corp. staked location for a long north and east outpost to the same area of Driver field. Its 2 Marion B. Hutchison, in NW SW 17-36-T4S-T&P, was projected to 8,200 ft. Location is some 3 miles northwest of the Heugler well.

Sinclair Oil & Gas Co. completed a good well on the southwest side of the Bigby area (designated Driver, in southwest Glasscock County), as its 8 Fannie Boyd. Flowing potential was 568 bbl. of oil through open 2-in. tubing, from open hole between 6,694-6,805 ft. Top of pay was 6,700 ft., on elevation of 2,705 ft.

Development work in Wilshire-Ellenburger field of Upton County included two extension locations by Wilshire Oil Co. North of production, Wilshire 31-130 McElroy Ranch was located in SW NE of Section 130, and west of production, Wilshire 32-135 McElroy will be in SW NE of Section 135.

On the north side of the Midland County portion of Driver field, Sharples Oil Corp. 4-F TXL extended production and completed for 713 bbl. of oil a day. The flow was through 1-in. tubing choke, from pay at 7,084-7,341 ft.

In Reeves County, Gulf Oil Corp. and Jack Frost 1 P. G. Northrup, deep test some 24 miles southeast of Pecos, developed shows of oil and gas at 9,890-9,945 ft., and in coring ahead from that depth was reported to have encountered high-pressure gas. Operators were building up their mud weight. A previous test at 9,890-9,945 ft. had a small show of gas at the surface and recovered 30 ft. of clean oil, plus 150 ft. of oil and gas-cut mud.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

King County: Ard Drilling Co. et al 1 T. B. Masterson, Sec. 1, TW&NG Sur., TD 4,371 ft., reef pay 4,362 ft., IP pumped 132 bbl. 41°-gravity oil.

Runnels County: Geochemical Surveys 1 M. L. Wood, A. Losoya Sur., 515, TD 3,915 ft., perforated Fry sand 3,648-54 ft., IP 213 bbl. 44°-gravity oil, ¼-in. choke, TP 650 psi., GOR 800 cu. ft.

Ward County: Texas Gulf Producing Co. 1-10 University, 14-16-University, TD 2,920 ft., Yates 2,640 ft., IP 35 bbl. 28°-gravity oil, ½-in. choke, TP 45 psi., GOR 365 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Humble Oil & Refining Co. 1-C Evans, 29-73-PSL, dry, TD 12,503 ft., elev. 3,168 ft., Strawn 8,360 ft., Devonian 9,055 ft., Silurian 9,466 ft., Simpson 11,400 ft., Ellenburger 12,260 ft.

Cochran County: Joseph I. O'Neill, Jr. 1-A Levens, 7-Y-PSL, dry, TD 4,949 ft.

Coke County: Lone Star Producing Co. 1 H. G. Wendland, Sec. 459, L. Leiberman Sur., dry, TD 5,678 ft., Palo Pinto 4,805 ft., Strawn 5,140 ft.

Glasscock County: Magnolia Petroleum Co. 1 J. C. Bryans, 26-35-T4S-T&P, dry, TD 11,022 ft., elev. 2,718 ft., Spraberry 6,200 ft., Strawn 9,932 ft., Devonian 10,530 ft., Ellenburger 10,920 ft.

King County: Panhandle Producing & Refining Co. 1 Pitchfork Land & Cattle Co., Sec. 136, John Wilson Sur., dry, TD 4,995 ft.

Humble Oil & Refining Co. 77 Bateman, Sec. 38, R. M. Thompson Sur., dry, TD 5,481 ft.

Mitchell County: Ray A. Albaugh 1 W. T. Scott, 11-17-SPRR, dry, TD 8,540 ft., elev. 2,349 ft., Pennsylvanian 6,606 ft., Strawn 8,200 ft., Mississippian 8,315 ft., Ellenburger 8,505 ft.

Pecos County: Ashmun & Hilliard 1 Water Improvement District 3, 11-9-H&GN, dry, TD 2,210 ft.

Hunt Oil Co. 37 Elsinore, 67-D-GC&SF, dry, TD 1,408 ft.

Runnels County: Clark & Cowden 1 H. P. Morrison, Sec. 14, A. Losoya Sur., dry, TD 4,045 ft.

F. Kirk Johnson 1 Mrs. Lizzie Toney, 77-63-CTRR, dry, TD 4,753 ft.

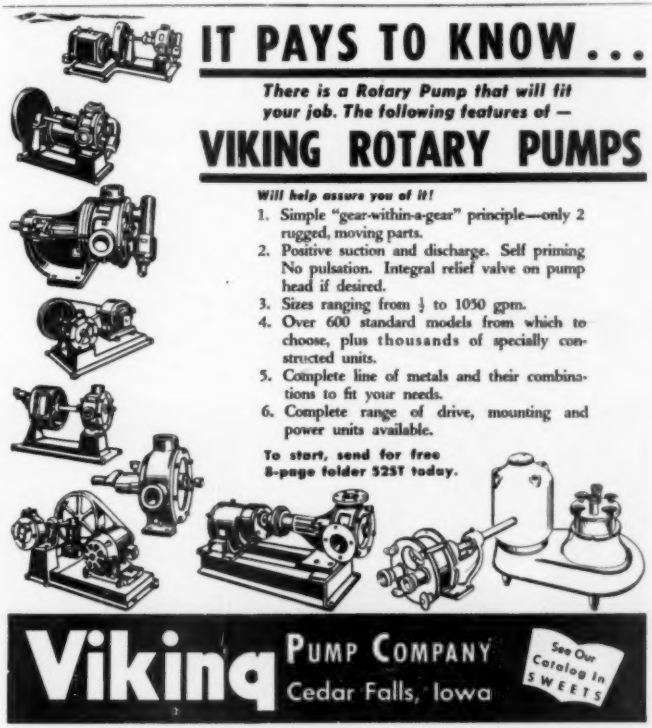
Tom Green County: La Gloria Corp. 1 H. C. Adams, S. P. Werner Sur. 2,207, dry, TD 4,940 ft., elev. 1,785 ft., Strawn 4,380 ft., Ellenburger 4,930 ft.

Ward County: J. J. Rogers and L. B. Thomas 1 Taylor, 17-B29-PSL, dry, TD 2,897 ft.

SOUTHEASTERN NEW MEXICO

Humble Oil & Refining Co. 1 Federal-Elliott, west-central Lea County, Pennsylvanian discovery, developed a flow of 130 bbl. of 48°-gravity oil a day from perforations in the upper Pennsylvanian at 12,880-910 ft.

Joseph O'Neill, Jr. 1-A State, Wichita Albany discovery northeast of Hare field.


IT PAYS TO KNOW...
There is a Rotary Pump that will fit your job. The following features of —
VIKING ROTARY PUMPS
Will help assure you of it!
1. Simple "gear-within-a-gear" principle—only 2 rugged, moving parts.
2. Positive suction and discharge. Self priming No pulsation. Integral relief valve on pump head if desired.
3. Sizes ranging from ½ to 1050 gpm.
4. Over 600 standard models from which to choose, plus thousands of specially constructed units.
5. Complete line of metals and their combinations to fit your needs.
6. Complete range of drive, mounting and power units available.
To start, send for free 8-page folder 5257 today.
Viking Pump Company
Cedar Falls, Iowa
See Our Catalog In SWEETS

ALTEN
Leads Again with
PRE-TESTED UNITS

Buy Alten Oil Field Pumping Equipment at Your Local Supply Store.

Alten sets a new pattern of progress and performance in the industry by thoroughly pre-testing every pumping unit sold. Extra care in building plus constant engineering improvement means less down time and more fluid pumped at less cost. You can be sure every Alten unit will perform to its full rated capacity. Constant quality control—not spot checking—rules Alten production. Component parts are thoroughly inspected at every phase of manufacture. Particular attention is given gear trains—the very backbone of the unit. Each is placed in operation and has to prove itself in tests that meet the challenge of harsh operating conditions. Any discrepancies are uncovered before the unit reaches the field.

—ALTEN—
Foundry & Machine Works, Inc.
LANCASTER, OHIO

completed for 125 bbl. of 38°-gravity oil a day, flowing through ¾-in. choke from perforations at 7,440-49 ft.

Skelly Oil Co. 1-O Mexico, 6-25s-38e, a west outpost to West Dollarhide field of Lea County, added shallow production to the area. Completion was in the Queen sand from 3,670-3,836 ft., plugged back total depth, and potential was 82 bbl. of oil a day on the pump.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCATS

Lea County: Stanolind Oil & Gas Co. 11-X State, 4-19s-38e, TD 8,160 ft., elev. 3,639 ft., Drinkard 6,430 ft., perforated 6,886-6,988 ft., IP pumped 65 bbl. 35°-gravity oil.

The Texas Co. 1 C. E. Penny-Federal, 5-25s-38e, TD 9,405 ft., elev. 3,148 ft., Devonian 8,177 ft., IP 611 bbl. 38°-gravity oil, 24/64-in. choke, TP 225 psi., GOR 1,312 cu. ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: American Republics Corp. 1 Dale Resler, 10-19s-27e, dry, TD 2,514 ft. elev. 3,474 ft., Queen sand 1,105 ft.

Lea County: The Texas Co. 1 State "AZ," 20-14s-32e, dry, TD 10,708 ft., elev. 4,362 ft., Tubb 6,730 ft., Abo 7,480 ft., Wolfcamp 8,810 ft.

The Texas Co. 1 State "BC," 33-11s-32e, 6,495 ft., Abo 7,260 ft., Mississippian dry, TD 11,942 ft., elev. 4,412 ft., Tubb 11,227 ft., Devonian 11,868 ft.

South Louisiana

Second Production Test Conducted at Cameron Well

NEW ORLEANS.—A second successful production test has been conducted at Superior Oil Co. 1 Rockefeller, 4-16s-3w, Cameron Parish prospect. On 12-hour test from perforations at 9,952-58 ft., the well flowed at the rate of 122 bbl. of 55.5°-gravity distillate through a 22/64-in. bottom choke and 5/8-in. top choke. In addition, the well flowed 6,264,000 cu. ft. of gas daily. Tubing pressure was 3,015 psi. It is reported that operator will squeeze these perforations and conduct 5 other tests on the well.

Meanwhile, Superior is drilling below 8,735 ft. at 2 Rockefeller, a northeast confirmation test to the well.

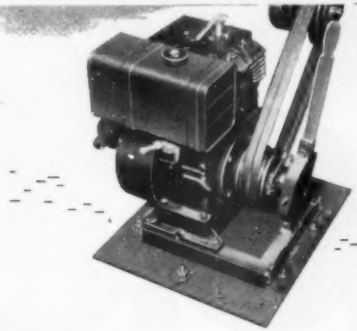
While reports are not complete on Union Producing Co. and Texas Gulf Producing Co. 1 La Terre Co. "C," wildcat in the Dulac area of Terrebonne Parish, it is indicated that the well is being completed. Operators drilled the venture to total depth of 14,678 ft. and have perforated at 14,148-56 ft. It is reported that the well flowed both gas and distillate.

In the Iota area of Acadia Parish, Pan American Production Co. 1 Anchille Andrepont, 42-8s-1w, flowed 85 bbl. of fluid on drill-stem test at 9,267-72 ft. The fluid content was 74 per cent oil and 26 per cent salt water. Flow was gaged through 8/64-in. choke. Gravity of the oil was 33°. This well is bottomed at 10,746 ft., with casing set at that depth, and operator ran 2½-in. tubing at 9,252 ft. On a previous test of these same perforations, the well flowed 70 bbl. of fluid through a 10/64-in. choke, which was 55 per cent oil and 45 per cent salt water. Tanks are now being built for final potential.

Leslie Bowling 1 LaTerre Co., 49-19s-19e,

Start engines the reliable way with

UNITED
Multi-Cylinder
ENGINE STARTER



Prices on Application.
(Most popular size $292.00)

- **RELIABLE** — Continuous cranking power from easily started gasoline engine.
- **ECONOMICAL** — Pays for itself by eliminating troublesome battery, generator and starter maintenance.
- **SAFE** — Recommended by safety engineers.
- **EASILY INSTALLED** — Simply remove electric starting motor and insert Heavy Duty Bendix Starter Drive Assembly. (Bendix Drive operates off of ring gear. Specify type of engine to be started when ordering.)

At Your Nearest United Supply Store

ELIMINATES BATTERY

ELIMINATES ELECTRIC STARTER

ELIMINATES GENERATOR

Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

wildcat in Terrebonne Parish, has been drilled to total depth of 13,389 ft. and operator is running casing to bottom. There is no indication where testing will be conducted.

Humble Oil and Refining Co. has completed a shallow gas well in Block 34, South Timbalier area off Terrebonne Parish. Through a 16/64-in. choke, the well flowed gas at the rate of 2,089,000 cu. ft. daily under tubing pressure of 1,480 psi. Venture is A-1 State Lease 1027, and is producing through perforations at 3,722-30 ft.

SOUTH LOUISIANA WILDCAT FAILURE

Lafourche Parish: Humble Oil & Refining Co. 1 Zeno Bourgeois et al, 84-14s-16e, dry, TD 12,616 ft.

Eastern Texas

Oil Strike Completed At Woodlawn Stepout

DALLAS.—Kemp Drilling Co., Inc. has completed its 1 Reed & Bitner as a flowing oil well, and a northwest stepout to Woodlawn gas-distillate field. Potential was 317 bbl. of 44°-gravity oil a day through 14/64-in. choke from perforations in the Pettit limestone at 6,566½-72½ ft. Gas-oil ratio was 701 cu. ft.

Humble Oil & Refining Co. 1 Marberry, deep Freestone County wildcat, was coring ahead below 13,038 ft. Cores at 12,828-78 and 12,984-13,034 ft. had no shows.

Sun Oil Co. has completed its 3 McCrary in the new McCrary pool of Wood County, southwest of Winnsboro. Potential was 218 bbl. of oil a day on the pump from the sub-Clarksville sand at 4,351-61 ft.

A new operation and extension test to Scottsville gas field of eastern Harrison County was under way by Midstates Oil Corp. as its 1 Lancaster, W. Linville Survey. Location is on a 154-acre tract.

J. Z. Werby has filed application to drill 1 L. Sanders, W. K. D. Spain Survey, Titus County, as an 8,200-ft. test. The proposed wildcat is 6 miles southeast of Mt. Pleasant. Elevation is 315 ft.

In the Tennessee Colony area, Humble 1 R. B. Douglas, Bettick Survey, flowed at the rate of 105 bbl. of 59°-gravity oil a day through 3/16-in. choke, from perforations at 8,952-65 ft., in the lower Rodessa. Com-

Are your **OIL INVESTMENTS** *Closely Held or Family Owned?*

We specialize in the making of oil loans and advising on the financial problems of independently owned oil and gas producing properties.

C. LESLIE RICE, *Vice President* — J. F. DOUGHERTY, *Vice President*

Oil Department

Empire Trust Company

7 WEST 51st STREET

at Rockefeller Center, New York, N. Y.

Absorb the SHOCK

Pat. applied for

The "O-Ring" seat absorbs the shock of hard pumping conditions by cushioning the ball as it contacts the seat. This seat available in "flat-style" only.

Where pitting and corrosion causes ball failures we offer the "Sheralloy" ball to mate with the stainless steel "O-Ring" seat. Prices for this combination furnished on request.

Available at your supply store.

BM-2-8

BAIRD MANUFACTURING CO.

P.O. BOX 380-TULSA

You're not seeing **double...** *It's* **2** *machines* **in one!**

Machine Printed Answers
Positive Multiplier Control
Automatic Printed Division
Single Key Depression
Automatic Credit Balance

UNDERWOOD SUNDSTRAND AUTOMATIC PRINTING CALCULATOR does the work of *two* different machines. Change from payrolls to inventories . . . from computing interest to figuring statistical calculations . . . *without changing machines.* Adds, subtracts, multiplies, divides.

It performs all various functions with the famous Touch Operated Underwood Sundstrand 10-Key Keyboard that speeds work, reduces fatigue, cuts errors.

UNDERWOOD CORPORATION

ONE PARK AVE., NEW YORK 16, N. Y.

pletion potential on the lower formation makes the well a dual producer. First completion was from the Pettit at 8,952-65 ft. which gaged 207 bbl. of 54°-gravity oil a day on 3/16-in. choke.

Canadian Fields

Large Gas Flow Reported In Alberta Venture

CALGARY.—The team of Wilrich Petroleums, Ltd., Trans-Era Oils, Ltd., and F. I. Batcheller has struck a large flow of gas in the Cadomin formation at its driller in the northwest sector of Alberta. This venture, in the Bonanza area, a few miles east of the British Columbia border, previously found gas in the Cadotte zone.

The well, Wilrich 2 Bonanza, on LSD 6, 13-80-13w6, contacted the Cadomin, and ran drill-stem test from 4,205-12 ft. Wilrich officials reported that gas flow rate was 7,650,000 cu. ft. daily, with flowing pressure 1,200 psi., and shut-in pressure 1,750 psi. Coring and testing is continuing. Drill-stem test at this extension gas success, in the Cadotte zone, gave a gas flow rate of 1,850,000 cu. ft. daily from interval 2,221-36 ft.

The Superior Oils Group has indicated another ¼-mile north extension to Joseph Lake Viking sand field. The new indicated oil producer, Superior 94 Joseph Lake, on LSD 16, 27-50-22w4, at the extreme north end of a lease block held by the group, showed sizable recoveries of clean crude oil during drill-stem tests. These tests: interval 3,287-93 ft., valve open 1 hour, maximum gas flow 970,000 cu. ft. pipe recovery 300 ft. of clean oil; and drill-stem test of interval 3,292-97 ft., with valve open 1 hour flowed gas at 798,000 cu. ft. and recorded a pipe recovery of 900 ft. clean oil plus 480 ft. of salt water. This well is now standing with production casing set to boottom 3,358 ft.

The Barons-Trans-Western 2 Flynn well in the northeast sector of the Campbell Lower Cretaceous field has been assured of oil production during a series of drill-stem tests run during the past week. The No. 2 well, on LSD 16, 35-54-25w, is a ¼-mile north offset to Barons 1 Flynnn at the northeast corner of Campbell field. Drill-stem test from 3,640-75 ft. flowed gas to the surface 1½ minutes after valve was opened. Gas flow rate commenced at 3,500,000 cu. ft. daily and built up to 9,503,000 cu. ft. by the end of the 20-minute test. First oil recovery was recorded during drill-stem test from 3,688-3,700 ft., which showed an oil spray to the surface in 16 minutes and a pipe recovery of 600 ft. clean oil. Further tests lower in the Cretaceous formation flowed clean crude oil to the surface and established an oil pay thickness of 25 ft. Production casing will be set at this well now bottomed at 3,721 ft. and a service rig will be used for completion.

Tri-Zone Oil Co. has chalked up a third gas flow from the Viking sand formation at its step-out venture in the Fort Saskatchewan area of central Alberta. This well, 2 Tri-Zone, on LSD 7, 26-54-22w, ¾ of a mile southeast of the company's No. 1 shut-in gas well, ran drill-stem test in the Viking sand of interval 2,448-58 ft. During 1 hour that packer was open the well flowed natural gas at a maximum daily rate of 1,290,000 cu. ft. through ¼-in. choke. Previous tests at this well, of interval 2,426-38 ft., gave gas at 5,100,000 cu. ft. daily through ½-in. choke;

This announcement appears as a matter of record only and is under no circumstances to be construed as an offering of these securities for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such securities. The offering is made only by the Prospectus

NEW ISSUE

120,000 Shares

General Gas Corporation

Common Stock

Par Value $5.00 per Share

Price $9.375 per Share

Copies of the Prospectus may be obtained in any State in which this announcement is circulated from only such of the underwriters, including the undersigned, as may legally offer these securities in such State.

Kidder, Peabody & Co.

April 24, 1952.

We've lost count!

The number of drums made by Moon machines must have reached astronomical figures. Whether large or small, for light work or heavy duty, every drum is sound and strong, and made with a speed and efficiency for which Moon machines are famous.

Write for our latest Broadsheet

MOON

Regd. Trade Mark

LONDON OFFICE: Abbey House, 2/8 Victoria Street, Westminster, London, S.W.1., England. Cables: Moonbro, Sowest, London, England.

MOON BROTHERS LIMITED, BEAUFORT ROAD, BIRKENHEAD, ENGLAND

Cables: "Moonbro" Birkenhead, England

AGENTS IN U.S.A.: M. Neumunz & Son Incorporated, 90 West Street, New York 6, New York

AGENTS IN CANADA: Dominion Welders & Machinery Ltd., 322 Lumsden Avenue, Toronto 13

MAKERS OF TIN BOX AND DRUM MAKING MACHINERY

dm MB 48

BJ TYPE "B"

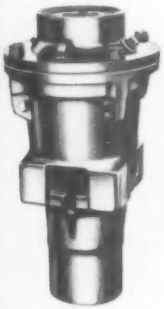
SHOCK ABSORBING

KELLY BUSHING

Reduces vibration—eliminates heavy impact load on machinery, chains and bearings!

The smooth, shock absorbing action of BJ's new Type "B" Kelly Bushing saves your machinery by reducing the vibration that pulsates up the string from the bit. BJ's patented and exclusive oil resistant Neoprene rubber cushion dampens the kick of the bit—protects the table, driving mechanism and draw works from costly damage. You get safer, shock-free feed for all square kellys from 3" to 6".

A BJ Type "B" Kelly Bushing gives you *all* these *engineered* features!



EXCLUSIVE PATENTED RUBBER CUSHION—Insures quiet, shock-free drilling—protects driving mechanism.

INTEGRAL GUIDE SKIRT—Centers bushing and kelly in rotary easily, quickly...and safely!

SOLID ONE PIECE BODY—Made to "take it"—has corrugated inner bore for greater strength—longer life.

4 CORRUGATED SLIPS—"Dovetail" into rubber cushion for smoother drive.

BUILT-IN KELLY WIPERS—Built-in wipers top and bottom and a Wiper Protection Assembly prevents wiper damage.

CONSTANT KELLY LUBRICATION—Body is fully grease-packed ...fittings are provided for oil *or* grease lubrication between kelly and liners...another exclusive BJ feature.

REVERSIBLE STEEL LINERS—Give longer wear and lower replacement cost—are surface-hardened, replaceable and reversible *end for end*—kelly will not hang up...even at high RPM and under high bit pressures.

For faster, easier drilling, equip your rig with an economical BJ Type "B" Kelly Bushing. See your BJ Representative or local supply house for further information.

Available through your supply store

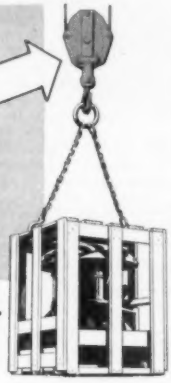
Byron Jackson Co.

BJ MEANS ENGINEERED OIL TOOLS

PB OIL FIELD & INDUSTRIAL SPECIALTIES

INFERNO
Pull Chain

GAUGE COCKS
For those inconvenient places where the hand can't reach. Available in Stainless Steel or ordinary Forged Steel for working pressures to 1000 lbs.
The INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

What's the capacity of this block?

If you don't know.. don't use it!

Specify AMERICAN CROSBY Load-Rated! BLOCKS
Safe working capacity embossed on side plate
DISTRIBUTORS EVERYWHERE
AMERICAN HOIST & DERRICK CO.
ST. PAUL 1, MINNESOTA

and of interval 2,425-41 ft. showed gas at 5,300,000 cu. ft. daily. Crew is currently running electric-log at 2,461 ft.

The Pacific Group 7 Fort St. John well in northeast British Columbia obtained natural gas at rate in excess of 3,000,000 cu. ft. daily during drill-stem test over the past week, and crew is continuing to core and test in this upper Triassic zone that last week gave up its initial gas. Some naphtha and oil showings were also found. Fort St. John No. 7, on LSD 14, 15-83-18w, discovered oil in the Cadomin formation about 2 weeks ago, and is located about 1½ miles southeast of the group's No. 4 mid-Triassic natural gas discovery well. At bottom 3,772 ft., the No. 7 well has opened up around 85 ft. of pay zone in the upper Triassic. Drill-stem tests in that zone have yielded a total natural gas flow rate of 6,264,000 cu. ft. daily.

CANADIAN WILDCAT FAILURES

Homestead-North Canadian 12-14, LSD 12, 14-48-21w4, TD 3,290 ft.

Texaco-Admiral-Carleton 1 Beaverhill Lake, LSD 8, 11-51-20w4, TD 4,800 ft.

Alberta Giant 3 Boyle, LSD 7, 35-64-19w4, TD 2,175 ft.

Golden Spike-Dempsey 1 Hercules, LSD 7, 27-51-23w4, TD 5,381 ft.

Lee Carlson 4-32 Miller, LSD 4, 32-52-23w4, TD 3,850 ft.

Canada Southern-Brown T Tellington, LSD 16, 10-53-6w4, TD 2,095 ft.

EASTERN CANADA

Drilling on the Otter River in Oxford County 5 miles east of Tillsonburg, Tri-County Gas & Oil Co. has brought in a gasser on the Frank Stier farm at 1,166 ft. depth. Following initial showings, the well was shot with 40 qts. of nitro, and is being shut in. Volume has not been estimated but it is the sixth good producer out of nine tests. The company, backed by London and Tillsonburg men sells its production to Norotto Gas Co. which distributes to Norwith, Otterville and Springford.

In Aldborough Township, near Wardsville, Western Ashley 1 Tom Morrison farm, has finished in the Guelph-Niagara formation with 2,000,000 cu. ft. estimated open flow. Rig is being moved for a new test.

Mississippi

New Wilcox Pool Indicated In Jefferson County

JACKSON.—A new Wilcox oil pool is indicated in Jefferson County at J. Willis Hughes 1 Logan-Shields, 20-8n-1w, which cored good shows in the 4,600-ft. zone. Hole was drilled to total depth of 6,652 ft. in Wilcox. Electric log and sidewall cores indicated good shows at 4,150-68 ft. with salt water immediately below. Operator cemented casing at 4,228 ft. and conducted a 1-hour drill-stem test at 4,150-54 ft. When test tool was pulled, recovery was 240 ft. of water cushion slightly cut with green oil. Bottom-hole pressure was 1,805 psi. These perforations will be squeezed and operator will reperforate at 4,162-63 ft. in an attempt to hit an oil column.

In Baxterville field, Lamar County, Gulf Refining Co. 25 Andrews, 6-1n-16w, deep test for the field, cored and drill-stem tested a very encouraging show of oil in the Lower Cretaceous. On drill-stem test at 10,829-70 ft., using ¼-in. bottom and 3/16-in.

PERRAULT
X-TRUDE
THERMO-PLASTIC PIPE
FOR
THE OIL INDUSTRY
THE GAS INDUSTRY
FRESH WATER SYSTEMS
SALT WATER SYSTEMS
"Everything for the Pipeliner"
PERRAULT Brothers
1130 NO. BOSTON, TULSA, OKLA. • 5-1103
Export Office:
30 ROCKEFELLER PLAZA
NEW YORK, N.Y.
CIRCLE 6-6260

Starrett "Oil Gager" STEEL TAPES

No. 507 ½" wide for heavy oils
No. 508 ⅜" wide for light oils
Approved by A.P.I. for use by engineers and oil gagers. Hardened steel frame, lock-type winding handle, removable hardwood grip, easy-reading tape graduated in feet, inches and eighths (also available in Metric). No. 507 furnished with 20¼ oz. bob for heavy oils. No. 508 with 5½ oz. bob for light crude, gasoline, etc.
WRITE FOR BULLETIN NO. 112 OG
THE L. S. STARRETT COMPANY · ATHOL, MASS., U.S.A.
Starrett
SINCE 1880 WORLD'S GREATEST TOOLMAKERS
BUY THROUGH YOUR DISTRIBUTOR MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS · DIAL INDICATORS · STEEL TAPES · PRECISION GROUND FLAT STOCK · HACKSAWS, BAND SAWS and BAND KNIVES

top chokes, and 1,500 ft. of water cushion, recovery was water cushion plus 3,063 ft. of 40.7°-gravity oil. Tool was left open 12 minutes. A core cut at 10,787-10,822 ft. 5 ft. of black shale with show of green oil; another at 10,824-58 ft. had 5 ft. of saturated sand, 1 ft. of sand with oil sand, 6 in. of saturated sand, and 26½ ft. of grey and black shale with no show.

Baxterville field produces from the lower Tuscaloosa formation with gravity of the oil being 14°.

Gulf Refining Co. 5 Crosby Lumber Co., Wilcox sand discovery in Wilkinson County, Miss., is still shut-in for storage and completion test has not been made. This well flowed 100 bbl. of oil daily through 9/16-in. choke on preliminary test. Tubing pressure was 300 psi. Production was from perforations at 7,160-66 ft. The name "Wilkinson" has been adopted for the field.

Lion Oil Co. is still fishing for stuck drill stem at its deep Rankin County wildcat, 2 Dankmann, 22-7n-4e. Total depth of the venture is 16,276 ft. Shows have been logged below 15,000 ft., and operators are expected to drill-stem test the section from 16,208-76 ft. after the drill-stem has been recovered.

Continental Oil Co. is preparing to core ahead below 10,882 ft. at 1 J. B. Lee, 4-9n-2e, Madison County wildcat.

MISSISSIPPI WILDCAT FAILURES

Adams County: B. Serio 1 Mildred W. McGilroy, 75-7n-1w, dry, TD 6,608 ft.

Franklin County: Kemp Drilling Co. 1 Hattie Godbold Bauer, 25-5n-1e, dry, TD 7,012 ft.

ALABAMA WILDCAT FAILURE

Blount County: Ben Stein 1 B. M. Carr, 5-11s-1e, dry, TD 1,122 ft.

North-Central Texas

Conglomerate Pool Reported In Montague County

WICHITA FALLS. — Montague County gained a new conglomerate oil pool, east of Eagle-Strawn field, at W. T. Waggoner estate 1 P. Carminati. The well made a flowing potential of 240.6 bbl. of oil a day through ¾-in. choke, from pay at 5,982-96 ft. Location is 1½ miles north of Montague in the W. Bennett Survey.

Further development southeast of Montague was promised with the staking of two wildcats. George S. Engle 1 S. J. Brown is to be a 7,500-ft. test 8 miles southeast of Montague in the J. Rippletoe Survey, A-653. In the same area, Bay Petroleum Corp. located its 1 E. E. Johnson in the R. T. Biggar Survey, A-1,021.

Hiawatha Oil & Gas Co. 1 Ida Harris completed as a discovery well in sandy conglomerate, flowing 164 bbl. of 41°-gravity oil a day through 20/64-in. choke. Operators had made several swabbing and flowing tests throughout the section from around 6,100 ft. to 6,200 ft. Good flowing production was had after treating with Sandfrac between 6,250-60 ft. Location is 5 miles east of Sunset in southern Montague County.

In the West Central Texas area, Haskell and Fisher counties drew two wildcats. Deeper of the two was Humble Oil & Refining Co. 1 Dora Foster, contracted to 6,300 ft. Location is 4 miles northeast of Rule in the J. D. Whitten Survey, Haskell County. General Crude Oil Co. staked location for a 5,500-ft. wildcat 8 miles west of the town of Hamlin, as the 1 Coy A. Thompson, 100-1-H&TC.

In Jack County, Lone Star Producing Co. 1 F. L. Shawver, wildcat in the W. H. Davis Survey, was drilling at 5,143 ft. Drill-stem tests in conglomerate at 4,697-4,714, 4,759-90 and 5,097-5,511 ft. recovered mud with no shows.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Brown County: Trans-Texas Exploration Co. 1 Ben Davis, J. J. Clelland Sur. 63, TD 1,562 ft., elev. 1,520 ft., Caddo 1,510 ft., IP pumped 20 bbl. 38°-gravity oil.

Coleman County: Richard King, Jr. 1 J. C. King, Sec. 3, T&NO, TD 3,585 ft., elev. 2,046 ft., Gardner 3,450 ft., IP 85 bbl. 43°-gravity oil, 31/64-in. choke, TP 250 psi., GOR 1,000 cu. ft.

Montague County: Martin Wunderlich 1 J. E. Rushing, 1,284-21-H&TC, TD 5,995 ft., elev. 854 ft., Caddo pay 5,742 ft., IP pumped 10 bbl. 40°-gravity oil.

Nolan County: Eastern States Petroleum Co. 1 Fred C. Daugherty, 43-22-T&P, TD 6,507 ft., elev. 2,378 ft., Strawn pay 6,118 ft., IP 395 bbl. 42°-gravity oil, 12/64-in. choke, TP 650 psi., GOR 500 cu. ft.

Palo Pinto County: Ernest Loyd 12 Mrs. E. Harnett, T. Harrell Sur., A-236, TD 1,399 ft., pay 1,385 ft., IP pumped 26 bbl. 49°-gravity oil.

Stephens County: V. B. Ross 1 Ethel Louder, Sec. 2,260, TE&L, TD 3,344 ft., elev. 1,257 ft., pay 3,318 ft., IP pumped 200 bbl. 44°-gravity oil, GOR 460 cu. ft.

Throckmorton County: Burk Royalty Co. 1 Gregory, Sec. 255, BBB&C Sur., TD 4,448 ft., elev. 1,465 ft., pay 4,437 ft., IP 112 bbl. 41°-gravity oil, ¼-in. choke, TP 475 psi., GOR 925 cu. ft.

Young County: American Drilling Co. 1 H. Snanafelt, Blk. 17, J. Poitevant Sur., TD 2,980 ft., pay 2,960 ft., IP pumped 45 bbl. 41°-gravity oil.

Brinsmere Oil Co. 1 W. P. Buch, Sec. 3,411, TE&L Sur., TD 4,106 ft., McLester sand pay 3,874 ft., IP pumped 26 bbl. 41°-gravity oil.

O. P. Leonard 1-A Shanafelt, AB&M Sur., TD 705 ft., gas sand 640-73 ft., IP

Woodson Oil Co. 1 W. O. Hayter, Sec. 4,000,000 cu. ft. of gas.

1,597, TE&L Sur., TD 5,108 ft., Mississippian 5,020 ft., IP 113 bbl. 42°-gravity oil, 8/64-in. choke, TP 500 psi., GOR 350 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Consolidated Oil Co. 1-A Coleman, Blk. 54, L. Pennington Sur., dry, TD 5,337 ft., Vogtsberger 4,441 ft., Caddo 5,274 ft.

Deep Rock Oil Corp. 1 L. T. Key, Blk. 43, John Harris Subd., dry, TD 5,550 ft., elev. 1,133 ft., Caddo 4,812 ft., Mississippian 5,258 ft., Ellenburger 5,502 ft.

Sam Lett 1 D. W. Jackson, J. J. Ellerd Sur., A-885, dry, TD 4,752 ft.

Reno Oil Co. 1 Parrish-Tyler, ATNCL Sur., dry, TD 5,450 ft.

Reno Oil and C. L. McMahon 1 Ted Coleman, Blk. 22, Brazos CSL Sur., dry, TD 5,772 ft.

J. D. Richey 3 J. B. Frerich, 4-106-Clark & Plumb, dry, TD 1,241 ft.

G. J. Scholl 1 B. C. Andrews, G. C. Frarley Sur., dry, TD 998 ft.

L. M. Stallup 1 W. W. Weinzaphfel, 107-4-Clark & Plumb, dry, TD 1,355 ft.

Underwood Drilling Co. 1-B Campbell, Blk. 1,378, TE&L Sur., dry, TD 5,285 ft.

Baylor County: Fortex Oil Co. 1-A Burrel Mills, Sec. 2,414, TE&L Sur., dry, TD 1,942 ft.

Panhandle Producing & Refining Co. 1 J. L. Hargrave, Sec. 3,140, TE&L, dry, TD 5,150 ft.

Callahan County: Baldridge & King 1 E. P. Miller, Sec. 32, BBB&C Sur., dry, TD 4,743 ft.

Deep Rock Oil Corp. 1 J. D. Isenhower, Sec. 7, BOH Sur., dry, TD 4,133 ft., elev. 1,690 ft., Ellenburger 4,090 ft.

Pitzer & Sons 1 Sam Windham, G. W. Denton Sur. 349, dry, TD 3,622 ft.

Trim-M Production Co. 1-A Walter Davis, Sec. 125, GH&H, dry, TD 3,997 ft.

Clay County: Baker & Taylor Drilling Co. 1 Ray E. Wines, 9,667-T&NO, dry, TD 6,6285 ft., elev. 1,264 ft., Caddo 6,026 ft., Simpson 6,336 ft., Ellenburger 6,596 ft.

Tom B. Medders 2 Mary Parrish Fowler, Blk. 25, T. J. Belcher Subd., dry, TD 4,410 ft.

P-M Drilling Co. 1 Fred Steinberger, BBB &C Sur. 2, dry, TD 4,506 ft.

A. A. Werlla 1 J. J. Donley, Blk. 60, Parker CSL, dry, TD 1,852 ft.

A. A. Werlla 2 Donley, Blk. 60, Parker CSL, dry, TD 1,852 ft.

Coleman County: E. B. Fletcher 1 J. T. West, Sec. 15, J. B. Beal Sur., dry, TD 3,422 ft., elev. 1,926 ft., Capps 3,064 ft., Gardner sand 3,296 ft.

Cooke County: Stanley Blackburn 1 A. C. Enderly, B. J. Thompson Sur., dry, TD 1,866 ft.

Continental Oil Co. 1 H. M. Berry, J. M. Culp Sur., A-1,611, dry, TD 6,034 ft., Strawn 1,239 ft., Bryson sand 3,672 ft., Caddo "K" zone 4,453 ft., Atoka 4,857 ft., igneous rock 6,035 ft.

M. T. Flanagan & Modesett 1 R. W. Brown, G. M. Bond Sur., dry, TD 2,088 ft.

Fred H. Keil 1 Chas. Bond, T. B. Stroud Sur., dry, TD 2,510 ft.

Eastland County: W. B. Hamilton 1 Mrs. J. T. Penn, Sec. 2, BBB&C, dry, TD 4,308 ft.

Jack County: Bridwell Oil Co. 9 Prideaux Est. SPRR Sur., A-581, dry, TD 3,659 ft.

Moran Bros. 1 D. R. Sewell, T. F. West Sur., A-1,591, dry, TD 5,396 ft.

Jones County: Andree Drilling Co. 1 J. J. Steele, 10-15-T&P, dry, TD 2,560 ft.

Luther Hedrick 1 C. M. Sayles, 47-16-T&P, dry, TD 2,020 ft.

Onyx Oil Co. 1 Ada S. Jennings, John H. Gibson Sur. 1, dry, TD 3,430 ft.

RH&R 1 A. S. Jennings, Sec. 207, BBB&C, dry, TD 2,008 ft.

Taubert & Harper 1 I. M. Treadwell, 48-1-BBB&C, dry, TD 2,956 ft.

R. J. Zonne 1 J. F. McCulloch, 32-1-BBB&C, dry, TD 3,815 ft.

Knox County: Wm. E. Jones 1 E. W. Hunt, Blk. 19, J. Gardner Sur., dry, TD 1,605 ft.

Montague County: Tom B. Medders 1 Jackson Heirs, Blk. 30, Titus CSL, dry, TD 6,324 ft., Caddo 6,109 ft., Marble Falls 6,308 ft.

Joe Reznik 1 H. B. Moss, Sec. 88, Chas. Lockhart Sur., dry, TD 5,804 ft., dolomite 5,794 ft.

Palo Pinto County: Melvin W. Jackson 1 Bert Slemmons, 52-3-T&P, dry, TD 1,564 ft.

Palo Pinto Oil & Gas Corp., 4 R. D. Hinkson, P. Miller Sur., A-312, dry, TD 1,824 ft.

Stephens County: Gene Nourse 1 Clara Swenson, 3-6-T&P, dry, TD 1,890 ft.

Robert Sunshine 2 D. M. Stanford, 45-6-T&P, dry, TD 2,015 ft.

Stonewall County: Woodward & Co. 1 Cleo W. Smith, A. C. George Sur., dry,

Mined and processed by people who know and "live" mud, Magcogel Bentonite adds just the "right touch" to your drilling mud because . . . it is completely dispersed and quickly hydrated so that its effect on wall building and gel properties is present as soon as the mud enters the hole. Magcogel makes a low-per-barrel-cost mud because so little is needed. It has all the desirable properties of a good drilling fluid except weight.

Magcogel Bentonite is made from carefully selected high gel type colloidal Wyoming bentonite, carefully mined and processed under rigid laboratory control at the newest and most modern bentonite mill in the world.

Look for the Magcobar sign when you need mud. More than 350 Magcobar Dealers are ready with adequate stocks of Magcogel Bentonite to enable you . . . night or day . . . to add just the right touch to your drilling mud.

MAGNET COVE BARIUM CORPORATION

ONE OF THE DRESSER INDUSTRIES

MALVERN ARKANSAS • HOUSTON, TEXAS

The new Magcobar bentonite mill and mine at Greybull, Wyoming, will add more than a million tons of carefully selected, high gel type, colloidal Wyoming bentonite reserves, for use by the oil industry.

ONE OF THE BEST THINGS THAT EVER HAPPENED TO THE OIL INDUSTRY

Magcobar

Complete

DRILLING MUD SERVICE

DEALER

Magcobar • Magcogel • High Yield • Magco-Fiber • Xact Clay • Fiber Seal • Leather-Flac • Form-A-Plug • Cell-O-Seal Salt Gel • Magco-Phos • Red Ox • Magco-Mica • Tannathin Jel-Oil Mud • Jel-Oil "E" • "E" Concentrate • Noheev My-Lo-Jel Preservative • Quebracho • Chemicals

Why invest $2500.00 for a 4x6 Pumping Unit

Manufactured By
FRANK WHEATLEY PUMP & VALVE MFR.

When $1500.00 will buy Wheatley's 3½x5?

Wheatley's 3½" x 5" pump answers the old demand for a unit smaller than the conventional 4" x 6" field utility pump. Assembled with engine, skid and drive it weighs only 1400 lbs. Two Wheel trailer assembly, shown above, also available. It's the only piston pump of its size that will buck main line pressures.

Pipeliners themselves, are standardizing the Wheatley 3½" x 5" for rugged field use. Over 2500 of these pumps are in operation NOW!

	Pressure	BPH	Plunger Load	Weight
2"	854	34		
2½"	520	56		
3"	350	83	2500#	690#
3½"	255	114		

BRING ALL YOUR PUMP REQUIREMENTS TO . . . .

CHARLES WHEATLEY Company

TULSA, Oklahoma City, Bartlesville, Okla.
Houston, Odessa, Texas – Shreveport, La.

TD 5,986 ft., elev. 1,529 ft., Strawn 5,060 ft., base Caddo 5,765 ft.

Throckmorton County: Ashland Oil & Gas Co. 1 J. D. Falls, Sec. 242, BBB&C Sur., dry, TD 4,759 ft., Caddo 4,582 ft.

Wilbarger County: Ted A. Norwood 1-G W. T. Waggoner, 38-14-H&TC, dry, TD 2,500 ft.

Young County: Carl C. Harris 1 E. E. Giggers, TE&L Sur., dry, TD 3,600 ft.
H. F. Snebold 1 E. E. Moore, Sec. 1,019, TE&L, dry, TD 2,853 ft.
Warren Oil Corp. 3-K Allar Co., Sec. 1,653, TE&L, dry, TD 3,783 ft., Caddo 3,648 ft.

Texas Gulf Coast

Oil Production Opens In San Jacinto Field

HOUSTON.—First oil production is being opened in San Jacinto field, Harris County, at Houston Oil Co. of Texas C-2 Foster Lumber Co., located on the east flank of the pool. The well came in flowing 180 bbl. of oil daily from perforations at 7,489-90 ft. through 7/64-in. choke. Tubing pressure registered 2,250 psi. Late reports indicate that the gas flow increased and the oil flow dropped off to 25 bbl. per day through a 6/64-in. choke, with a gas-oil ratio of 12,000 to 1. Well was drilled to 8,514 ft. and 5½-in. casing was set at 8,069 ft. Location is in William Colton Survey, Abstract 194.

In the Flag Pond area of Brazoria County, The Superior Oil Co. is in the process of completing a new gas-distillate discovery. Venture is 1 Mae C. McDonald, Zeno Phillips Survey 33, Abstract 118, and is in a gas producing area which has been suspected of having oil. From casing perforations at 10,014-28 ft., on 3-hour drill-stem test, the well flowed at the rate of 229 bbl. of 54.5°-gravity distillate daily through 11/64-in. choke. The well is also cleaning gas and distillate from tubing perforations at 10,368-91 ft. A dual completion will be made on the venture.

In the Big Hill area of Jefferson County, Deep South Oil Co. is running casing at 2 Security Bank and Trust Co. to test a new 31-ft. sand from 8,725-59 ft., which is highly saturated from 8,725-28 ft. Another sand was logged below 10,000 ft. which will be tested. Operator is setting 7-in. casing to total depth of 10,233 ft.

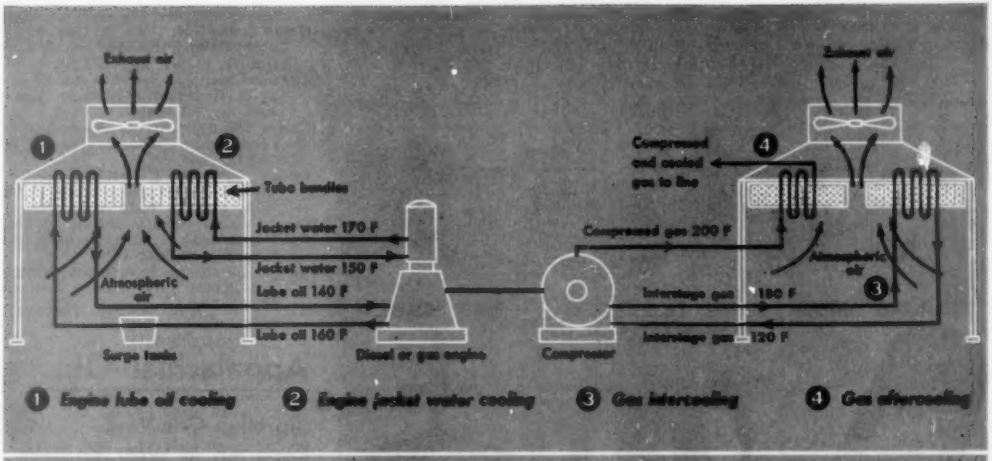
One mile north of Freisburg production in Colorado County, Anderson-Prichard Oil Corp. recovered oil on drill-stem test at 1 R. A. Johnson, Edward Ruhman Survey, Abstract 479. From perforations at 9,752-58 ft., recovery was an estimated 3 bbl. of 24°-gravity oil and 1,790 ft. of salt water. Crew is testing squeeze job on these perforations before reperforating 9,628-44 ft. for further testing.

In Wharton County, 2¼ miles north of New Taiton field production, Magnolia Petroleum Co. has prospects of completing the deepest producer on the Texas Gulf Coast at 1 Carl Reynolds. On test of perforations at 13,800-44 ft., using ¼-in. chokes, well developed 1,200 psi. working pressure at the surface and showed recovery of 800 ft. of gas-cut mud, heavily cut with gas. This venture is bottomed at 14,947 ft. and plugged back to 13,485 ft.

Sun Oil Co. has completed 1 Moudry unit, gas discovery in Stephen F. Austin Grant 4, Lot 5, Austin County. Completion was made in the Wilcox formation at 9,789-9,804 ft., from which the well flowed 2,300,000 cu.

ALCO AIRCOOLERS

SOLVE ALL 4 COOLING PROBLEMS



in high-pressure gas compressor stations

In a typical high-pressure gas compressor station, two ALCO Aircoolers shown in the illustration perform four major cooling duties: (1) engine lube oil cooling (2)engine jacket water cooling (3) gas intercooling (4) gas aftercooling.

Versatile ALCO Aircoolers are particularly effective in this type installation because they are designed to give long, efficient performance. Such troubles as scale, costly water treatment and other cooling problems are eliminated.

The heart of the ALCO Aircooler is the ALCO fin tube, which provides an extended outside surface for maximum heat transfer efficiency, coupled with low air-flow resistance for economy in operation. A continuous helically wound copper fin is bonded to the tube with lead-tin alloy, and the external tube surface is coated with this alloy to improve atmospheric corrosion resistance. The entire unit is quickly and easily assembled in the field.

To put all these money saving features to work for you, call your nearest ALCO Sales Engineer at Beaumont, Chicago, Houston, Los Angeles, New York or Tulsa for more information or

Send Coupon for ALCO Aircooler Bulletin.

ALCO

ALCO PRODUCTS DIVISION
AMERICAN LOCOMOTIVE COMPANY
Plants: Dunkirk, New York • Beaumont, Texas

***In step with tomorrow*— ALCO AIRCOOLERS, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe**

ALCO PRODUCTS DIVISION
AMERICAN LOCOMOTIVE COMPANY
Schenectady, N. Y.

Gentlemen: Please send me the ALCO Aircooler Bulletin.

Name..... Position.....

Company.....

Address.....

City..... Zone..... State.....

ft. of gas per day plus some 56.9°-gravity distillate. Hole is bottomed at 10,518 ft. with 7-in. casing cemented 3 ft. off bottom. Venture is shut-in with pressure of 3,215 psi.

One-half mile easterly from Sublime gas production in Colorado County, SoRelle & SoRelle have completed 1 A. G. Hooper Tract 59, for an extension to the field. On calculated open flow, the well has been potentialed for 12,000,000 cu. ft. of gas per day, plus 13 bbl. of distillate per million cu. ft. Production is from perforations at 9,438-44 ft., 9,444-62 ft., and 9,410-22 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Fort Bend County: new pay at Nash—Michel T. Halbouty & Carl Casey 1-C Kittie Nash Groce, Thos. Alsberry Sur., TD 4,204 ft., perf. 4,100-4,114 ft., IP 76 bbl. oil per day, 8/64-in. choke, TP 300 psi., CP 450 psi., 22.8° gravity.

New pay at Fulshear—The Texas Co. 2 Bertha Busch, I&GN RR Sur. A-262, TD 7,460 ft., perf. 7,067-69 ft., (Yegua) IP 43 bbl. oil per day, 8/64-in. choke, TP 2,100 psi., 37.2° gravity.

Goliad County: oil discovery—George R. Brown 1 A. Gruetzmacher, Mathew G. Carice Sur., A-90, TD 8,524 ft., perf. 8,046-54 ft., IP 32,000,000 cu. ft. of gas per day, open flow.

Montgomery County: oil discovery—Austral Oil Exploration 1 Katherine Risher Randall et al, Denward James Sur. A-289, TD 8,248 ft., Yegua 4,778-82 ft., IP 104 bbl. oil per day, 12/64-in. choke, TP 1,280 35° gravity.

RED DEVIL

"DIA-HARD" LINERS

For high pressure abrasive service

Forged in one piece from highest quality alloy steel. The deep HIGH-CARBON wear resistant case of maximum hardness and uniformity is obtainable only by our SPECIAL "DIA-HARD" PROCESS, greatly excelling all other known methods for longer life liners. The bore is PRECISION HONED, and ACCURATE OUTSIDE DIMENSIONS insure a perfect working fit with liner packing assembly and pump cylinder for positive leakproof sealing. Write for Catalog No. P-120.

TELL-TALE LINER PACKING ASSEMBLIES

Gives warning before damage

Tell-Tale Liner Packing Assembly consists of two "DIA-TEX" oil and heat resistant sealing rings separated by a precision made steel, corrosion-resistant lantern ring. Internal leakage is detected instantly in slush pumps through "tell-tale holes" before costly fluid cuts occur to cylinder walls. There is either a Tell-Tale Liner Packing Assembly or a "DIA-TEX" Sealing Ring available for all makes of slush pumps. Write for Catalog No. P-121.

LINER PULLERS

Save valuable time and labor

The Red Devil Liner Puller is a strong, heavy duty, dependable tool capable of pulling the most obstinate liner. Its operation is simple. There are no pins, connecting links or other small parts to bend, shear, break or become lost.

The "Universal Type" Puller (as illustrated) is designed for slush pumps. The "Expanding Grip Type" is designed for pulling thin wall-driven tube type liners, as used in small pumps. Write for Catalog No. P-122.

See Composite Catalog . . . For more detailed information on Red Devil Products, see the Composite Catalog or write for special price catalogs noted above. Red Devil products are available through your supply store.

OIL WELL MANUFACTURING CORP.

6002 South Alameda St., Los Angeles 1, California

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: Southern Minerals Corp. C-1 Claude E. Heard unit, James O'Reilly Sur., dry, TD 5,215 ft.

Calhoun County: J. W. Mecom 14 Minnie S. Welder, SA&MG RR Co., Sur. A-263, dry, TD 7,000 ft.

DeWitt County: Alaska Steamship Co., Kirkwood & Co. & E. W. Gill 1 Charles F. Kallina, E. C. Kallina and E. Caruthers Sur., dry, TD 8,500 ft.

Fort Bend County: Fort Bend Oil Co. 1 John M. Moore Est., W. T. Austin League, A-5, dry, TD 6,600 ft.

Goliad County: Salt Dome Oil Corp. & Currie B. Davis 1 Otto Abrameit, Solomon Hall Sur., A-140, dry, TD 4,256 ft.

Jackson County: Kirkwood & Co. et al 1 A. W. Henderson, SCA Rogers League, A-65, dry, TD 6,187 ft.

Karnes County: Cron & Gracey Corp. 1 Collier Baker, Charles Mash Sur., A-448, dry, TD 7,445 ft.

Lavaca County: H. J. Chavanne Trustee 1 Allen F. Carter, John Douglas Sur., A-136, dry, TD 10,251 ft.

Orange County: Houston Oil Co. of Texas 1 J. D. Bilbo et al, Josiah Brock Sur., A-48, dry, TD 9,005 ft.

Refugio County: Southern Minerals Corp. 1 John Keller, J. R. Tileston Sur., dry, TD 5,272 ft.

Appalachian-Ohio

Big Injun Gas Well Reported in West Virginia

PITTSBURGH.—In Center district, Gilmer County, West Virginia, Hope Natural Gas Co. 9706 Louis Bennett heirs, resulted in 1,087,000 cu. ft. gas, Big Injun sand, after shot, TD 2,160 ft. In Troy district, W. D. Bartlett 1 E. A. & Clinton Burton had a daily initial of 20 bbl. in the Gordon sand, TD 2,430 ft. Union district, Putnam County, Godfrey L. Cabot, Inc., 4-1368 Hatfield-Cambells Creek Coal Co., tested 465,000 cu. ft. gas, Corniferous lime 4,975 ft., Oriskany sand 5,052 ft., gas 5,053-62 ft., TD 5,075 ft. Clover district, Tucker County, Hope Natural Gas Co. 9691 Lee Spessert, is at a depth of 6,343 ft. and will run casing.

Maryland.—Garrett County: Eberly & Snee, 3 Eli Beechie, chert 4,076 ft., Oriskany sand 4,190 ft., will be re-shot. The gas still tests 340,000 cu. ft. New York State Natural Gas Corp. 2-N-247 is drilling at 6,281 ft. Mid-Atlantic Oil & Gas Co., ran casing in 1 B. & O. R. R. Co., at 3,633 ft. Heath 1, H. C. Gibson, is drilling at a depth of 3,725 ft., after a fishing job. Blaho Oil & Gas Co. 1 Joe Garrett, elevation 2,404 ft., recorded the chert at 3,540 ft., and is drilling at 3,688 ft.

Southwest Pennsylvania.—Unity Township, Westmoreland County: Peoples Natural Gas Co. 4003 A. J. Dotterway, elevation 2,094 ft., is drilling again and is at a depth of 2,125 ft. No. 4008 J. R. Frola, drilling at 660 ft.

OHIO

Indications of a gas pool in the southwest corner of Starr Township, Hocking County, were found by the Waverly Oil Works on 1 H. L. Hockman, Section 31. Clinton sand at 3,066-88 ft. gaged 125,000 cu. ft. natural and 600,000 cu. ft. with 1,000 lb. pressure when shut in the casing 2 hours after shot.

Willard Shrider et al 1 Chas. Veach, third quarter, New Castle Township, Coshocton County, extends the field ½ mile to the east. Clinton at 3,181-3,247 ft. showed 5 bbl. natural and 35 bbl. in 24 hours after a 90-qt. shot.

In the Bladensburg pool, L. H. Bebout 1 W. L. Hess, Section 15, Jackson Township, Knox County, made 7 bbl. natural and 70 bbl. in 24 hours after a 120-qt. shot. In Mount Zion pool the Mid East 1 Homer Thompson, Section 18, made 600,000 cu. ft. and 10 bbl. natural. The sand was logged at 2,931-80 ft., and will not be shot at this time.

OHIO SUCCESSFUL WILDCAT

Hocking County, Starr Township: Waverly Oil Works 1 H. L. Hockman, Sec. 31, Clinton, 600,000 cu. ft., TD 3,104 ft.

OHIO WILDCAT FAILURE

Washington County, Decatur Township: Mid East Oil Co. 1 Nellie Riddle, Sec. 8, Oriskany, dry, TD 4,093 ft.

California

Important Sespe Well Pumping at Torrey Canyon

LOS ANGELES.—Performance of Union Oil Co.'s deep Sespe zone discovery in Torrey Canyon field of Santa Clara Valley importance. Currently pumping and agitating indicates the new pool may be of major 18.5°-gravity crude at the rate of 650 bbl. daily, the well is producing from 1,600 ft. of nonmarine Sespe above 9,327 ft., total depth.

The discovery, 83 Torrey in 5-3n-18w, originally was to be drilled to a maximum depth of 7,500 ft. to test the Eocene. Encountering more Sespe oil sand than had been anticipated, drilling was carried to the limit of the rig's capacity. At 9,327 ft. the bit was still in the Sespe, with the sand's productivity improving with depth. Whether the unusual thickness is due to thickening or duplication because of faulting is not known. Company officials are most optimistic as to the discovery's importance.

Union, which holds 30,000 acres in fee around the Ventura County well, has started preparing location for 84 Torrey, a northeast offset. Preparations also were being made for 17 Simi, a 2½-mile southeast stepout in Section 3.

At Wheeler Ridge in Kern County, Richfield Oil Corp. has successfully corrected a faulty cement job in its 85-29 Kern County Land. The job on the 7-in. casing, cemented at 9,600 ft., failed under the 5,400 psi. bottom-hole pressures encountered. The situation was corrected, however, and the operator was preparing to run a 5½-in. protective string. The company rig used on the important Eocene discovery was to be moved to 76 K.C.L., a southwest offset in SE 29-11n-20w.

Extent of this new field discovery, which is believed to be from a structure independent of shallow Wheeler Ridge production, is yet to be determined. Richfield and Standard Oil Co. of California control practically all acreage in the immediate vicinity of the discovery. Since the well was brought in, flowing at a daily rate of 1,170 bbl. from 151 ft. of sand, an active lease play has been undertaken in the area, principally westward toward Maricopa.

Other California developments included the staking of a wildcat 1 mile west of Lomerias field in 5-12s-4e, San Benito County. The test will be Tide Water Associated Oil Co. 1 O'Connell. Immediate objective will be the 2,100-ft. sand which Jack Herley 1 O'Connell discovered in August 1950.

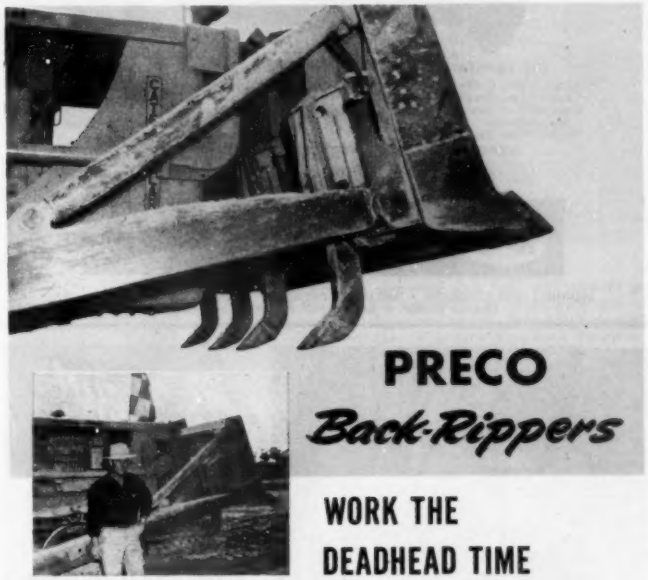
In the Saticoy area of Ventura County, General Petroleum Corp. will drill 42-27 Hill-Converse. It will be about ¾ mile southwest of West Mountain production. At Bardsdale, The Texas Co. was preparing to start 1 Elkins as an extension attempt in 7-3n-19w, and at Devils Canyon, 23-5n-18w, Continental Oil Co. was below 1,500 ft. at 1 McBurney-U.S.L.

An exceptionally large number of wildcats and extension attempts were abandoned during the week. Richfield abandoned 2 Butte Community-A in the Marysville area of Sutter County after drilling to 4,854 ft. In the Sharktooth area of Kern County, Wood-Callahan Oil Co. 14-1 "Well" was dry at 2,500 ft. and in the Richgrove area of Tulare County, Continental Oil Co. abandoned 1 Konda at 2,014 ft. in basement rocks. In Santa Barbara County, 12-8n-34w, Union Oil Co. 2-a Harris was halted after drilling to 9,515 ft.

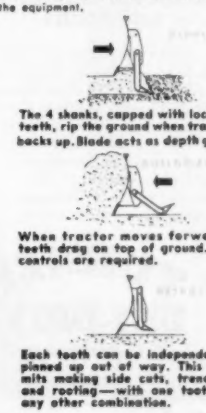
CALIFORNIA SUCCESSFUL WILDCATS

Monterey County, ½-mile east extension to San Ardo field: Standard Oil Co. B-14-5 Alexander, SW SW 5-23s-11e, pumped 44 bbl. per day through perforations at 2,492-2,618 ft., 11°-gravity crude, TD 2,618 ft., elev. 854 ft.

Los Angeles County, new fault-block pool in Sansinena area: Universal Cons. Oil Corp. 1 Curtis, NE NE 31-2s-10w, flowed 135 bbl. per day through perforations at 4,850-5,288 ft., 17°-gravity



Daley Corporation, San Diego Contractors, use Preco Back Rippers on their Caterpillar Diesel Tractors for stripping and all around ripping. Bob Caldwell, in charge of their job at the Miramar Air Base is shown with the equipment.


The 4 shanks, capped with lock-on teeth, rip the ground when tractor backs up. Blade acts as depth gage.
When tractor moves forward, teeth drag on top of ground. No controls are required.
Each tooth can be independently pinned up out of way. This permits making side cuts, trenches, and rooting—with one tooth or any other combination.

These four hinged teeth dig in and rip only when the tractor backs up. They make blading easier and faster because they rip out rocks, roots and hard ground, enabling the tractor to work a *full blade* with *less horsepower* on its next trip.

Like contractors all over America, you can save time and money by using Preco Back Rippers in building pioneer roads, clearing land and rights-of-way, in gravel pit operations, slate breaking in coal strip mines, for logging operations and mounted on pusher tractors for faster scraper loading.

See your "Caterpillar" dealer or write us for information.

PRECO
INCORPORATED
6360 E SLAUSON AVE., LOS ANGELES 22
CABLE ADDRESS: PRECO

For Safety Unsurpassed

KELCO Safety SPINNING LINE and BREAKOUT CATHEADS

The Model 16-LH Non-Fouling Cathead

THE OUTSTANDING CATHEAD OF TODAY AND TOMORROW

Anti-Fouling Catline Spool
Completely Housed Friction Cathead
Simplicity of Design, Operation and Maintenance
Double-Plate Clutch

Anti-Friction Bearings Throughout as Recommended by Leading Bearing Manufacturers
Choice of Mechanical, Hydraulic or Air Controls

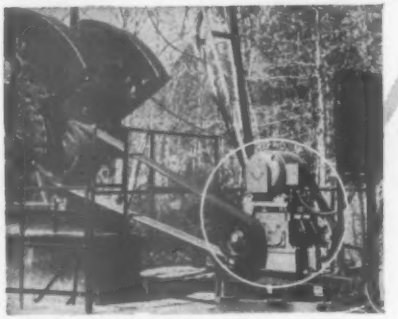
AVAILABLE THROUGH YOUR FAVORITE SUPPLY STORE

Representatives in All Fields

Be Safety Wise — KelCo-ize

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS
TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS



Typical oil field installation on single reduction pumping unit pumping 10, 13, 16 and 19 SPM.

New!

VARY SPMs at the TWIST of a WRIST!

4-SPEED TRANSMISSION
1 THRU 60 H. P.
FOR ALL TYPES and SPEEDS of ELECTRIC MOTORS and GAS ENGINES

Consider these applications and problems! Single Reduction Pumping Units—Pump as slow as conditions require—Double Reduction Units too—Tri-Plex and Centrifugal Pumps for Water Flood—Offers 4-Speed Flexibility—Pipe Line Gathering Pumps—Correcting Cold Weather Difficulties—Repressuring Plants—Geared Powers—Refineries—Drilling Rig Accessories—All Turner Transmissions are especially designed and guaranteed for continuous Oil Field Duty.

Write for bulletin 52-A and full details.

TURNER UNI-DRIVE Company

3416 Terrace Street — Kansas City 8, Missouri

crude, 18/64-in. bean, TD 5,288 ft., elev. 622 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Jasmine area: Pacific Oil & Gas Dev. Co. 1 Salca-Boone, 1-25s-27e, dry, TD 1,830 ft., elev. 651 ft.

Poso Creek area: Bishop Oil Co. 2 Movius B, 4-28s-27e, dry, TD 2,393 ft., elev. 789 ft.

Los Angeles County, Newhall area: J. W. Aidlin 1 Atwood, 10-3n-16w, dry, old TD 6,135 ft., redrilled from 1,965-2,614 ft. elev. 1,430 ft.

San Benito County, Ciervo anticline area: W. J. Fortier & Associates 1 Fortier, 14-17s-12e, dry, TD 1,056 ft., elev. 2,375 ft.

San Joaquin County, East Islands area: Amerada Petroleum Corp. 1 G & P, 29-3n-5e, dry, TD 5,460 ft., elev. 5 ft.

San Luis Obispo County, Tremblor Range area: Neaves Petroleum Developments 1 "Well," 33-32s-22e, dry, TD 3,780 ft., elev. 2,431 ft.

Oklahoma

Northeast Bradley Gets Deep Bromide Producer

GULF OIL CORP. appears to have a good producer in Bromide sand at its 2 Mainka-Ring unit, in the deep Northeast Bradley field, Grady County. With pay zone exposed through casing perforations at 12,836-13,049 ft., the well flowed 568 bbl. of oil with 138 bbl. of drilling water during an early 5-hour test through 32/64-in. choke. During a later 24-hour run through 16/64-in. choke, it made 631 bbl. of oil and 2,800,000 cu. ft. of gas with only 96 bbl. of drilling water.

The well, located in the C SE SW 1-5n-5w, is the northwest diagonal offset to the discovery well, and the third producer for the field. The discovery well, 1 Mainka, also produced originally from the Bromide, open at 12,855-12,985 ft., but latter was recompleted as a McLish sand well with pay at at 13,405-13,611 ft. At that depth, the well is the deepest producer in the state. The second well, 1 Mainka-Ring unit, the diagonal southeast offset to the discovery well, failed to produce from the Bromide, and then was completed as a Hunton lime well with pay exposed through casing perforations at 12,120-160 ft. The new well also is a potential producer from the Hunton lime and McLish sand, as well as the Tulip Creek sand.

Jon Carson and associates have opened another Red Fork sand pool for Lincoln County at their 1 Jones, SW SW NW 7-16n-2e, which now is being put on the pump after swabbing tests in which it produced up to 10 bbl. of oil per hour. The well is bottomed at 4,650 ft. and has 7-in. oil string run to 4,649 ft. and perforated in the pay at 4,624-30 ft. Only a trace of water was indicated.

Location is a mile north of Merrick in the northwestern part of the county, near the Logan County line. Drilling already is under way at a west offset, 1 Beck, SE SE NE 12-16n-1e, on the Logan County side of the line. Location also has been made for a south offset, 1 Walker, NW NW SW 7. The discovery well also has promising oil shows in Prue sand at 4,494-4,515 ft.

Production of the Northeast Edmond field, Oklahoma County, has been extended ¾ mile southward by Sterling Oil of Oklahoma, Inc., at its 1 Stephens, SE SE NW 31-14n-2w, ½ mile east of Edmond. Testing Bartlesville

sand in open hole at 5,989-6,001 ft., the well flowed 135 bbl. of oil the first 12 hours, 136 bbl. the second 12 hours, and 145 bbl. the third 12 hours. Production was through ½-in. choke with 225 psi. pressure on the tubing and 350 psi. on the casing.

Midstates Oil Co. has confirmed a Simpson sand discovery well that opened the Northeast Webb pool of Kay County, flowing oil from the lower Simpson at 2 Currie, in SW NW NW 17-28n-2w. The well, bottomed at 4,699 ft. with casing set just above total depth, was perforated at 4,687-92 ft. and flowed 32 bbl. of oil per hour on short tests through various chokes.

Production tests are scheduled at Jones-Shelburne and William G. Johnston 1 Todie Johnston, NE SE NE 5-13n-8e, Okfuskee County discovery. Cromwell sand, carrying stain and odor, was topped at 3,426 ft. A drill-stem test at 3,427-32½ ft. flowed gas in 3 minutes with no estimate on volume. Recovery was 20 ft. of mud. Hole was deepened at 3,438 ft. and a drill-stem test at 3,427-38 ft., open 1 hour, flowed gas in 4 minutes with no estimate and flowed oil with no estimate on rate. Recovery was 480 ft. of oil with no water. The new discovery is about 1 mile south of production in Southeast Arno pool. The West Arno pool which is expanding to the southeast lies about 3 miles west of the Okfuskee discovery, and The Texas Co. is completing some good flowing wells in Iron Post pool of Creek County, 2½ miles northeast.

Carter Oil Co. got a puff of gas but no oil and will reacidize Chester lime pay in a wildcat 5 miles southeast of Chaney in Ellis County, northwestern Oklahoma. Showing 10,000-15,000 cu. ft. of gas per day was 1 Keith C. Rosendale, C NW SE 22-23n-24w. No oil was recovered in swabbing from perforations at 8,607-35 ft. Total depth is 9,806 ft. with 7-in. casing cemented at 8,711 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Lincoln County: A. Finsten 2 Dumas, NW NW NE 6-16n-3e, pumped 55 bbl. of 38°-gravity oil from Wilcox 4,855-64 ft., TD 4,864 ft.

Major County: Continental Oil Co. et al 1 Kimball, NW NW SW 34-20n-16w, flowed 2,293 M.c.f. of gas and 138 bbl. distillate from Chester 8,372-8,452 ft., TD 11,861 ft. PBTD 8,536 ft.

Payne County: Wilcox Oil Co. 1 Sam, SW NW SW 3-18n-2e, flowed 30 bbl. oil from Red Fork, 4,325-39 ft., TD 4,885 ft. (new pay in Lost Creek pool).

OKLAHOMA WILDCAT FAILURES

Atoka County: A. G. Blauner and H. H. Copple 1 Rowland, NW NE NE 18-3s-10e, dry, TD 880 ft.

Carter County: F. Walters-R. Moss 1 R. Stigner, NE NE NE NW 6-1s-2w, dry, TD 2,030 ft.

Cleveland County: Ryan Oil Co. and Randall Morton 1 H. O. Brendle, SW SW NE 11-8n-1e, dry, 6,449 ft.

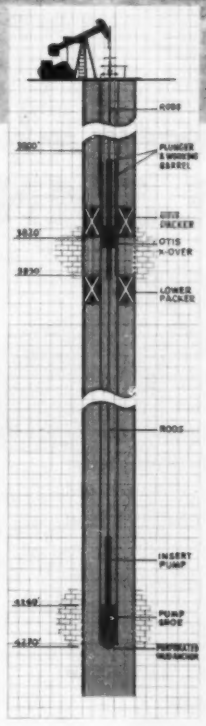
Garfield County: Roy Powell Associates 1 Ross Porter, SW SE NW 32-24n-3w, dry, TD 2,521 ft.

Lincoln County: E. J. Athens and Sunray Oil 1 Cox, SE SE NW 33-15n-2e, dry, TD 5,383 ft.

McElreath & Harvey 1 Foster, SW NE SW 22-15n-6e, dry, TD 4,292 ft.

Stephens County: Davenport Drilling Co. 1 Harley, SE SE NE NE 3-3s-7w, dry, TD 1,043 ft.

Washita County: Frank Buttram et al 1 H. P. Smith, C SE NW 34-8n-16w, dry, TD 10,020 ft.



If you are operating in a field with several good horizons, you will want to investigate this Otis equipment for pumping two formations through a single well bore. The Otis Two-Zone Pump is an assembly of two sub-surface pumps which stroke simultaneously on a single rod string. There are no complex fittings or complicated sub-surface installations, nor is any extra surface equipment required, other than an additional flow line at the wellhead. The lower zone is pumped in the tubing and crossed over into the annulus by means of a special Otis Cross-Over Packer which also serves to separate the two zones; at the same time, another pump produces the upper zone through the casing and into the tubing to surface *(see diagram)*. Actually, both formations are pumped in the conventional manner and at no time do the fluids commingle. Otis Two-Zone Pumps are in successful operation in multiple-pay fields throughout the Mid-Continent area. If you have production in such a field, ask your nearest Otis office to show you how you can pump a *second* oil well profitably and economically, and with a surprisingly small outlay for extra equipment. Or if you prefer, we'll be glad to send you illustrated bulletins containing complete details on this and other Otis equipment for producing both pumping and flowing multiple-zone wells. Contact Otis Pressure Control, Inc., 6612 Denton Dr., Box 7206, Dallas, or the Otis office in **Houston, Corpus Christi, Victoria, Falfurrias, Longview, New Iberia, Houma, Shreveport, Oklahoma City, or Elk City.**

PRESSURE CONTROL OTIS SERVICE EQUIPMENT

Otis Two-Zone Pump

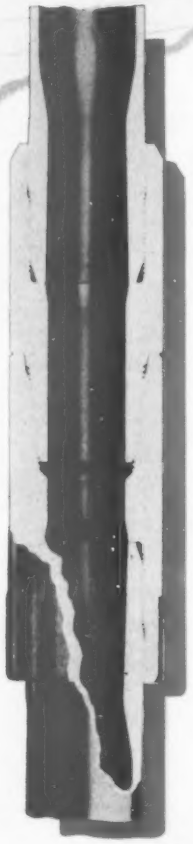
OTIS PRESSURE CONTROL, INC.

Here is one reason why

REED TOOL JOINTS *last longer*

REED specifications for tool joint steel call for a perfect balance of alloys and of the carbon content to produce a steel with better properties than that obtained from the American Iron and Steel Institute specifications, based on chemical and hardenability requirements only.

Fine steel is just one of the many important reasons why **REED** Tool Joints last longer.



REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK LONDON BUENOS AIRES

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

3479

Kansas

Oil Discovery Indicated in Unproductive Lane County

PROMISING oil showings have been found in a rank wildcat in another of western Kansas' so far unproductive counties. Showings were in Hugoton Production Co. 1 Flo, NW NE SW 19-17-29, in the north central part of Lane County. They were in the Lansing lime section, topped at 3,949 ft., and in which at least two drill-stem tests have given indications of possible production.

One drill-stem test, taking in an interval at 4,157-87 ft. and open only 12 minutes, yielded 400 ft. of heavily oil and gas-cut mud. The other, at 4,401-24 ft. with tool open 60 minutes, got 180 ft. of oil and 615 ft. of oil-cut mud. As this is written, hole has been deepened to 4,705 ft., where another test is being made.

Sunray Oil Corp. is starting production tests at its 1 Harper, prospective discovery well in the Ashland area, southeastern Clark County, southwestern Kansas. Prospective producing section is the Mississippian, through which casing was run to 5,615 ft. after hole had been drilled to 7,350 ft. Drill-stem tests at 5,461-93 ft., in the Chester zone, and at 5,540-50 ft. gave promising indications of gas and distillate production. The test of the lower interval also showed some oil. No showings of consequence were reported in the lower part of the hole. Location, in the C SE SE 21-34s-21w, is southeast of Ashland, and 4½ miles north of Harper County (Oklahoma) line.

KANSAS SUCCESSFUL WILDCATS

Clark County: Skelly Oil Co. 1 Theis "D," SW SW NE 8-34s-25w, flowed 2,600 M.c.f. of gas from Lansing-Kansas City 5,663-67 ft., TD 5,960 ft. PBTD 5,798 ft.

KANSAS WILDCAT FAILURES

Cowley County: Aylward 1 Brandenburg, SE NE SW 3-35s-3e, dry, TD 3,455 ft.

Decatur County: Strain-Brooks Hall 1 Odle, NW NW SE 14-2s-26w, dry, TD 3,833 ft.

Ellis County: Todd 1 Schmidtburger, NE NE NW 15-15s-16w, dry TD 3,553 ft.

Graham County: The Texas Co. 1 Wolf, SE SE SE 14-7s-23w, dry, TD 3,955 ft.

I. W. Siegel 1 Engleman, SW SW SE 24-8s-25w, dry, TD 4,250 ft.

Jones, Shelburne & Farmer 1 Svoboda, SW SW SE 22-10s-21w, dry, TD 3,744 ft.

Greenwood County: R. Smith 1 Snider, SE SE NW 16-24s-11e, dry, TD 2,090 ft.

Hodgeman County: I. W. Siegel 1 Charles, SW SW SW 19-23s-24w, dry, TD 4,778 ft.

Lyon County: Ben Brack et al 1 Miller, NE NE SW 24-19s-11e, dry, TD 2,630 ft.

McPherson County: Penguin 1 Regier, NE NE NE 23-21s-1w, dry, TD 3,654 ft.

Ness County: D. R. Lauck 1 McCreight, NE NE SW 9-20s-24w, dry, TD 4,528 ft.

Phillips County: Anschutz 1 Cannon, SW SW SW 17-2s-17w, dry, TD 3,850 ft.

Rush County: Northern Ordance 1 Hopkins, NE SW NW 10-16s-16w, dry, TD 3,578 ft.

Scott County: Flynn Oil Co. 1 Harris, NE NE NE 29-18s-32w, dry, TD 4,785 ft.

Sedgwick County: Chas. L. Carlock 1 Penner, NE NE SW 20-25s-2e, dry, TD 3,034 ft.

Sumner County: The Texas Co. 1 Zeigler, SW SW NE 10-30s-3w, dry, TD 4,414 ft.

Jackson 1 Stewart, NW NW NW 4-30s-4w, dry, TD 4,112 ft.

Central Area

INDIANA

A half mile from production in the area 3 miles south of Owensville, Gibson County, C. E. O'Neal and associates have an indicated two-zone oil discovery at their 1 Smith-Baird, SE SE SE 24-3s-12w. A 2-hour drill-stem test in O'Hara lime at 2,514-20 ft. got gas in 25 minutes and recovered 355 ft. of oil and 125 ft. of oil-cut mud. A similar test of McClosky lime at 2,524-30 ft. got gas in 25 minutes and filled 1,230 ft. of clean oil and 240 ft. of oil and gas-cut mud. Oil string has been run through both zones to 2,569 ft., total depth.

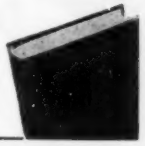
WESTERN KENTUCKY

Ralph Halbert 1 Polk, SE NW 7-M-30, 5 miles southeast of Utica in the northeast corner of McLean County, midway between the Barrett Hill and Maxwell pools, swabbed at the rate of 100 bbl. of oil per day while testing Tar Springs sand at 1,432-49 ft. Tar Springs sand is a new pay zone for the above pools. The well is a half mile from each.

MICHIGAN

A basal Salina-Niagaran contact gas pay was tested in Hamlin Township, Mason County, a deep brine well being drilled by The Dow Chemical Co. last week. Company's 32 Fee, SE NE NE 27-19n-18w, which is scheduled to be drilled to the granite at about 7,000 ft. before final completion as a brine well, was drill-stem tested from 3,950-4,212 ft. where a big gas blow was encountered. The testing period was run for 8 hours. Gas started to show in 2 minutes and was gaged at 7,125,000 cu. ft. a day. Calculated open flow, based on this and other gages, ranged from 12 - 15,000,000

Geophysical prospecting methods and their application in petroleum and mineral exploration



Here is a practical treatment of the fundamentals, procedures, uses, and value of all the standard methods of geophysical prospecting. For each method discussed, the book covers basic physical principles, instrumentation, field techniques, reduction and interpretation of field data.

The information each method yields, and its practical application and limitations in exploration are shown. Gravitational, magnetic, seismic, electrical, and radioactivity prospecting, and well logging techniques are treated. The book covers earthquake seismology, terrestrial magnetism, and the gravitational field of the earth . . . radio position location for geophysical work . . . and advanced research in geophysics. Much information is given to help in planning and projecting surveys and utilization of geophysical data that will give you better results in petroleum and mineral exploration.

Just Published

INTRODUCTION TO GEOPHYSICAL PROSPECTING

By *MILTON B. Dobrin*
Senior Research Technologist, Field Research Labs., Magnolia Petroleum Co.

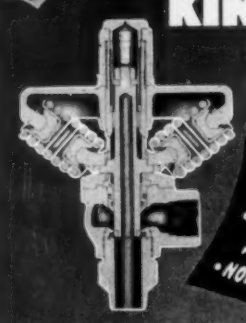
435 pp., 65 illustrations, $7

Gives practical data on such subjects as:

- aeromagnetic prospecting
- underwater gravity and seismic exploration techniques
- radio and radar position location methods
- use of the scintillation counter in prospecting
- gamma ray and neutron logging
- magnetic effect on oil-well casing
- flight pattern for aeromagnetic surveys
- seismic work on continental shelves
- identification of shales by potential logs
- and scores of others

THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

KINZBACH
Automatic Mud Relief Valve



- AUTOMATIC RESET
- SNAP ACTION
- NON-CHATTER

The Model 112 operates on working pressures from 750 to 2500 p.s.i. It Snaps Open for instantaneous pressure relief at maximum volume. It Snaps Shut to restore circulation instantly and automatically after a pre-determined pressure drop.

The Model 112 Valve can be used for any mud relief application, including compounding operations.

Write for bulletin 11250.

KINZBACH TOOL CO., INC.
P. O. Box 277,
Houston, Texas

KINZBACH TOOL CO INC

Export Office:
74 Trinity Place,
New York, N. Y.

cu. ft. of gas a day, but many engineers and geologists questioned the accuracy of these calculations on the basis of the information gained from this drill-stem test. Approximately 4 ft. of distillate showed on this test. Bottom-hole pressure was reported at 2,018 psi.

ILLINOIS WILDCAT FAILURES

Clay County: C. E. Brehm 1 Thilker, SW NE SE 2-5n-6e, dry, TD 2,922 ft.

Clinton County: Sun Oil Co. 1 Kahre, SE NW NE 21-1n-2w, dry, TD 2,806 ft.

John F. Dunnill 1 Dorries, SW NW SE 32-3n-3w, dry, TD 2,415 ft.

Douglas County: National Petroleum Chemical Co. 5-2 Petro, SE SW SE 13-16n-8e, dry, TD 800 ft.

Edgar County: Carl Wright 1-A York, SW NW NW 12-13n-14w, dry, TD 483 ft.

Victor S. Knutson 2 Clapp, SW SE SW 33-13n-13w, dry, TD 636 ft.

Hamilton County: The Texas Co. 1 Warren heirs, SE SW NE 9-7s-7e, dry, TD 3,263 ft.

T. M. Eagen 1 Mayberry, SE SE NW 9-6s-7e, dry, TD 3,331 ft.

Jasper County: H. F. Robinson 1 Bollinger, SW NW SE 17-8n-10e, dry, TD 2,604 ft.

Madison County: Joe Kesl 1 Gorenz, SW SW SE 5-5n-6w, dry, TD 655 ft.

Randolph County: Mervin & Steber 1 Stevenson, SW NW SW 7-4s-5w, dry, TD 2,836 ft.

Will County: C. L. Reed 1 Lewis, SE SW NE 10-34n-9e, dry, TD 365 ft.

INDIANA SUCCESSFUL WILDCATS

Gibson County: C. E. O'Neal et al 1 Woods, SE NW SW 9-3s-11w, IP 116 bbl., Aux Vases lime 2,367-73 ft., TD 2,514 ft. (extension McGary pool).

Knox County: Graham Development Co. 1 Collins, SE SE NW 34-2n-8w, IP 15 bbl., Aux Vases sand 1,373-76 ft., TD 1,376 ft. (discovery well Needmore pool).

Posey County: George S. Engle 1 Ries, SW NE SE 22-7s-14w, IP 181 bbl., Cypress 2,373-79 ft., TD 2,386 ft. (extension Mount Vernon pool).

INDIANA WILDCAT FAILURES

Gibson County: J. D. Turner 1 Sullivan, SW SW NW 20-3s-13w, dry, TD 2,373 ft.

G. C. Schoonmaker 1 Swank, SE SE NW 23-2s-11w, dry, TD 2,340 ft.

Knox County: George S. Engle 1 Pielemeier, E½ SE NW NW 28-1n-11w, dry, TD 2,200 ft.

Vigo County: T & H Corp. 1 Givens, SE SE NE 27-10n-8w, dry, TD 1,931 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Henderson County: George & Wrather 1 Galloway, W½ SW SW NW 22-Q-24, IP 30 bbl., Waltersburg 1,578-84 ft., TD 1,584 ft. (discovery well Henderson East pool).

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Canter Drilling Co. 1 Blair, NE SE SE 25-Q-27, dry, TD 2,033 ft.

Henderson County: A. W. Cherry 1 Knight, W½ NE NW NE 5-P-22, dry, TD 2,755 ft.

Muhlenberg County: R. W. Southard 1 Grace, SEc SW NW SW 2-H-28, dry, TD 1,750 ft.

Webster County: Hoosier Drilling Co. 1 Allen, NWc NE SW NW 14-N-23, dry, TD 2,781 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: P. K. Degenther 2 Radke, SE SW NW 31-2n-13w, Traverse 1,378 ft., dry, TD 1,383 ft.

Clyde Township: Robert W. Devine & J. W. Lang Co. 1 Ryan, NW NE NW 8-2n-15w, Traverse 1,319 ft., dry TD 1,370 ft.

Gratiot County, Lafayette Township: The Moco 1 Higby, NW NE SW 1-11n-1w, Dundee 3,229 ft., dry, TD 3,495 ft.

Montcalm County, Bloomer Township: Columbia Oil & Gas Co. 1 Argersinger, NW NW NE 5-9n-5w, Dundee 3,169 ft., dry, TD 3,185 ft.

Home Township: V. H. Fairless 1 Rasmusson, SE SE NW 5-12n-6w, Dundee 3,576 ft., dry, TD 3,805 ft.

Osceola County, Higland Township: Americrude Oil Co. 1 Van Houten, SW SW SW 5-20n-8w, Dundee 4,086 ft., dry, TD 4,200 ft.

Van Buren County, Columbia Township: Norman L. Stevens 1 Shaffer, NE NE SW 25-1s-15w, Traverse 1,228 ft., dry, TD 1,236 ft.

Rocky Mountain

Biggest Williston Strike Indicated at Cedar Creek

DENVER.—Shell Oil Co. has tested its northwest extension to The Texas Co.'s Cedar Creek discovery in Dawson County, Montana, for a flow of 3,500 bbl. of oil daily for what is apparently the biggest Williston basin producer to date. The well, in NW SW SE 26-15n-54e, made the record gage after acidizing perforations at 8,968-9,077 ft. Test was on ¾-in. choke, with tubing pressure during test 350 psi. A flow of 2,200 bbl. daily was reported from the zones 8,861-96 ft. and 8,908-46 ft. after acidization. Testing is continuing.

THE OIL AND GAS JOURNAL

"She's ridin' awful easy—suppose they slipped again?"

DIAMONDS
solve tough problems
CORING WASHOVER
STRAIGHT HOLE DRILLING
WINDOW CUTTING • WHIPSTOCKING, ETC.

Drilling & Service
3031 Elm Street Dallas 1, Texas
OFFICE PHONE: RIverside-6811
NIGHT NUMBERS: TRemont-5559, VIctor-3708, DIxon-4176

Other Offices-Services
Tyler, Texas.....2-2742 Shreveport, La....5-5474
Odessa, Texas....6-6774 Casper, Wyo.....3739
Abilene, Texas....2-2790 Carmi, Ill.....7799
Victoria, Texas.....3264 Ft. Morgan, Colo....1143
Norman, Okla.....4360 Great Bend, Kans...7585

Distributors
Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949
Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861

Foreign
D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.
Petroleum Industry Consultants, C. A., Caracas, Venez.
Denton - Spencer Co., Ltd., Calgary, Alberta, Canada.

See News Section for additional reports on Williston basin activity.

Carter and Continental's 2 Ute-Tribal, C SE NW 16-4s-4w, in the Duchesne unit flowed 30 bbl. of oil in 20 minutes following acidization of basal Green River for an important extension ½ mile west of the field discovery well. Gulf's 2-mile north extension to Roosevelt pool is producing from basal Green River at an estimated 1,000 bbl. daily rate.

WYOMING SUCCESSFUL WILDCAT

Park County, West Sage Creek: Shell Oil Co. 1 Unit, S½ NW SE 14-57n-98w, pumped 75 bbl. oil per day. TD 4,801 ft., Tensleep 4,080 ft., Amsden 4,308 ft., Madison 4,527 ft.

WYOMING WILDCAT FAILURE

Natrona County, South Geary dome: Sohio Petroleum Corp. 1 Beavens-Williams, C SE SW 27-34n-77w, dry, TD 6,935 ft. Frontier 5,570 ft., Muddy 6,651 ft., Dakota 6,783 ft., Lakota 6,900 ft.

COLORADO SUCCESSFUL WILDCATS

Logan County, West Peetz: Vaughey & Vaughey 1 Hugh Williams, NE NE NE 1-11n-53w, pumped 75 bbl. oil per day, TD 5,365 ft. Greenhorn 4,937 ft., "D" sand 5,180 ft., "J" sand 5,304 ft. (new pay discovery).

Moffat County, Powder Wash: Mountain Fuel Supply Co. 1 Hal Stewart, C SW SW 32-12n-97w, IP 1,170 M.c.f. of gas per day, TD 7,654 ft. PBTD 6,353 ft. Ft. Union 5,530 ft., Lance 6,730 ft. (Lance discovery—new pay).

COLORADO WILDCAT FAILURES

Logan County: Fisher & Ward 1 Miller, NW NW NE 9-9n-52w, dry, TD 4,945 ft., Muddy 4,622 ft., Dakota 4,754 ft., Fuson 4,906 ft.

A. A. Buchanan 1 Rose, NW NE SW 14-10n-52w, dry, TD 4,940 ft., "D" sand 4,747 ft., "J" sand 4,860 ft., Skull Creek 4,929 ft.

Morgan County: Carl Brazell & Otis Roberts 1 Golgart, SW SW SW 27-6n-57w, dry, TD 6,510 ft. Fuson 6,176 ft., Lakota 6,319 ft., Morrison 6,444 ft.

MONTANA WILDCAT FAILURE

Hill County: Union Oil Co. of California 7 State S-13, C NE¼ 36-35n-9e, dry, TD 2,500 ft. Blackleaf 1,850 ft., Bow Island 2,353 ft.

UTAH WILDCAT FAILURE

Uintah County, Oil Springs: Continental Oil Co. 2-A Unit, NW NW SW 18-12s-25e, dry, TD 4,170 ft. Wasatch 1,710 ft., Mesaverde 2,695 ft.

WESTERN NEBRASKA SUCCESSFUL WILDCATS

Cheyenne County, Cook area: Ohio Oil Co. 1 M. Cook, SW SW SW 24-15n-48w, pumped 60 bbl. oil per day, TD 4,575 ft., first Dakota 4,359 ft., third Dakota 4,491 ft.

Kimball County, Goodwin area: Vaughey & Vaughey 1 F. L. B. Goodwin, C SE SE 9-13n-54w, pumped 262 bbl. oil per day through 20/64-in. choke, TD 6,130 ft. "D" sand 5,928 ft., "J" sand 6,044 ft.

NORTH DAKOTA SUCCESSFUL WILDCAT

Williams County, Tioga area: Amerada Petroleum Corp. 1 Harry Bakken, C SW NW 12-157-95w, IP flow 25 bbl. per hour through ¼-in. choke. TD 13,709 ft. PBTD 12,490 ft. Kinderhook shale 9,615 ft., Devonian 9,729 ft., Jefferson 9,906 ft., Devonian salt 10,905 ft., Winnipeg 13,410 ft.

NORTH DAKOTA WILDCAT FAILURE

Ward County: H. L. Hunt 1 Joe Wold, C SE SW 23-155n-81w, dry, TD 8,625 ft. Spearfish 3,920 ft., Charles 4,540 ft., Madison 4,754 ft., granite 8,626 ft.

Conduit oil-proofed with TAPE!

Water, oil, dust can't penetrate conduit wrapped with plastic tape

Electric motors—used on oil well pump installations—pose a serious problem. Oil, snow and rain penetrating ordinary flexible conduit can cause expensive breakdowns of the pumping system.

Forrest E. Chancellor of the Chancellor Electric Company, Oildale, California, licked this problem by wrapping the conduit with "SCOTCH" No. 33 Electrical Tape. Here's what Mr. Chancellor says about his experience . . .

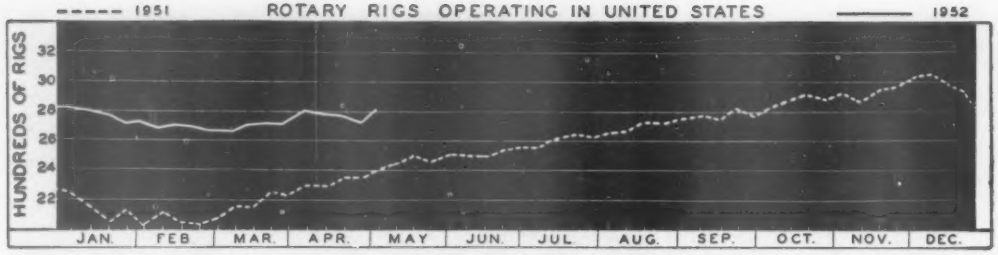
We find that by applying "SCOTCH" No. 33 Tape lapped spirally to the outside of the conduit, this oil and weather-proofing problem can be solved, giving an A-1 electrical job . . .

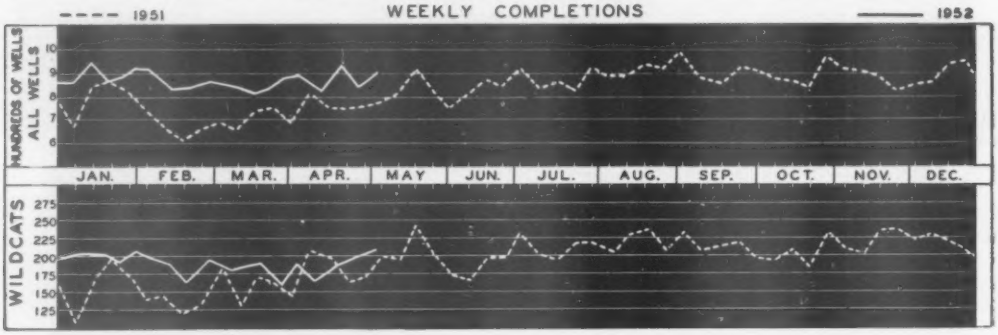
FIVE MINUTES——→ and less than one-third of a roll of tape—give you a snug, permanent wrap that protects conduit, yet is flexible enough to permit regulation of belt tension . . . or to move entire installation with ease! Write Dept. OG-52 for complete information.

Quick facts about "SCOTCH" No. 33 Electrical Tape

- **TOUGH**—plastic backing resists oil, water, acids, weather.
- **STRETCHY**—conforms snugly to any surface.
- **HIGH DIELECTRIC**—10,000 volts.
- **THIN CALIPER**—.007 inch—no bulky splices.
- **WIDTHS**—½ in., ¾ in., 3 in., 4 in.

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. Gen. Export: 270 Park Ave., New York 17, N.Y. In Canada: London, Ont., Can.





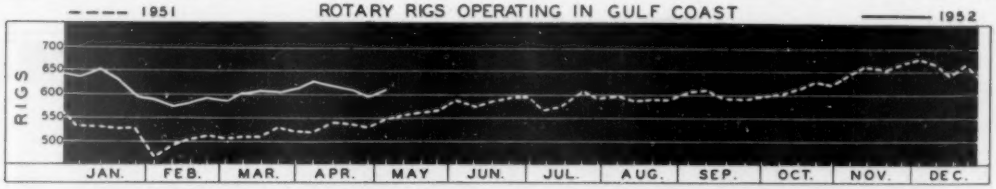
CURRENT STATISTICS

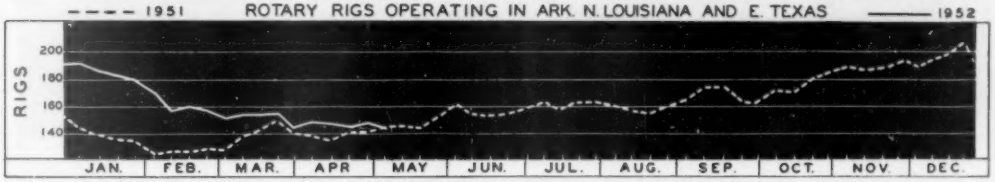
EXPLORATION

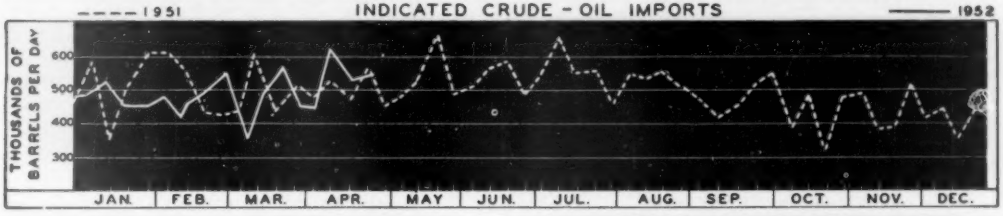
WEEKLY WELL COMPLETIONS . . . . WEEK ENDED MAY 3, 1952

	Total of all wells					May 3		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	9	0	*9	24,000	209	80	0	0	0	0	0	0	0	0	0	0
Pennsylvania	38	16	6	†16	77,660	560	257	0	0	0	0	0	0	0	0	2	2
West Virginia	12	1	10	1	40,277	227	189	0	0	0	0	0	0	0	2	1	3
Ohio	18	6	4	8	38,112	298	265	0	0	1	1	2	0	0	5	2	7
Indiana	25	10	0	15	45,352	358	310	3	0	0	4	7	14	0	2	107	123
Kentucky	25	13	4	8	47,013	411	272	1	0	0	4	5	9	0	0	69	78
Illinois	29	9	1	19	68,837	484	537	0	0	0	12	12	7	0	0	126	133
Michigan	17	4	0	13	43,501	229	225	0	0	0	7	7	10	0	1	83	94
Kansas	73	34	6	33	251,345	1,641	1,363	0	0	1	17	18	30	0	5	275	310
Nebraska	4	3	0	1	19,509	81	97	2	0	0	1	3	4	0	0	44	48
Oklahoma	112	65	6	‡41	436,196	2,089	1,842	2	0	1	8	11	35	1	7	216	259
Texas	401	234	28	139	1,942,133	6,153	5,455	17	0	5	89	111	279	27	47	1,299	1,652
North Central (Dist. 7-B & 9)	120	48	2	§70	387,293	1,892	1,657	10	0	1	47	58	161	1	14	558	734
West (Dist. 7-C & 8)	118	97	0	21	690,152	1,898	1,684	3	0	0	13	16	49	0	3	220	272
Panhandle (Dist. 10)	22	9	11	2	61,051	237	238	0	0	0	0	0	1	0	2	19	22
Eastern (Dist. 5 & 6)	18	14	0	4	104,081	323	381	0	0	0	0	0	10	3	0	74	87
Gulf Coast (Dist. 2 & 3)	66	38	9	19	421,526	925	748	3	0	1	10	14	36	15	12	184	247
Southwest (Dist. 1 & 4)	57	28	6	23	278,030	878	747	1	0	3	19	23	22	8	16	244	290
Louisiana	43	26	4	13	268,148	760	661	0	0	0	3	3	14	6	4	83	107
Northern	26	14	4	8	76,817	414	325	0	0	0	2	2	6	0	4	36	46
Southern	17	12	0	5	191,331	346	336	0	0	0	1	1	8	6	0	47	61
Arkansas	6	2	0	4	26,629	127	126	0	0	0	1	1	4	0	0	19	23
Mississippi	5	1	0	4	38,319	134	84	0	0	0	2	2	6	1	1	50	58
Southeastern States	2	1	0	1	7,297	17	29	0	0	0	1	1	1	0	1	10	12
Montana	3	1	0	2	11,119	61	71	0	0	0	1	1	2	0	0	17	19
Wyoming	14	9	1	4	71,428	222	225	1	0	0	1	2	11	0	2	34	47
Colorado-Utah	6	1	1	4	33,584	172	84	1	0	1	4	6	9	0	5	57	71
New Mexico	13	7	2	4	77,682	321	217	2	0	0	3	5	12	0	1	30	43
California	37	27	2	8	139,838	868	673	2	0	0	6	8	36	0	1	156	193
North Dakota	4	3	0	1	47,686	11	2	1	0	0	1	2	2	0	0	4	6
Miscellaneous (Iowa)	1	0	0	1	2,335	23	12	0	0	0	1	1	0	0	6	10	16
Total United States	906	482	75	349	3,758,000	15,456	13,076	32	0	9	167	208	485	35	90	2,694	3,304
Total previous week	844	428	56	360	3,491,060			17	2	7	173	199	453	35	81	2,527	3,096
Total May 5, 1951	783	389	40	354	3,023,025			32	0	4	164	200	454	26	84	2,340	2,904

Service wells included: *9, †13, ‡1, §3.



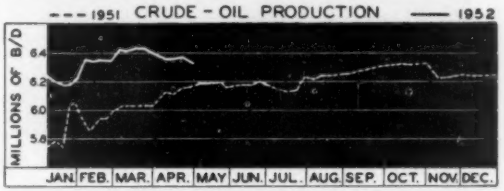


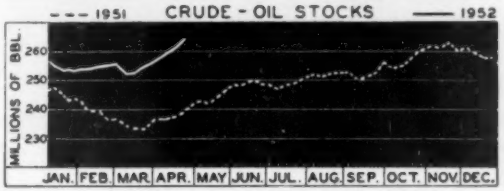


DAILY AVERAGE PRODUCTION FOR WEEK

	May 3, 1952			April 26
	Crude oil	Lease condensate	Total	total
Alabama	2,700	....	2,700	2,700
Arkansas	75,925	4,875	80,800	81,000
California	980,100	....	980,100	980,800
Colorado	86,100	....	86,100	86,800
Eastern	58,900	....	58,900	58,700
Florida	1,725	....	1,725	1,775
Illinois	167,700	....	167,700	168,300
Indiana	30,900	....	30,900	29,800
Kansas	318,200	....	318,200	317,900
Kentucky	35,100	....	35,100	35,500
Louisiana	624,450	38,750	663,200	663,900
North	113,850	14,250	128,100	128,400
South	510,600	24,500	535,100	535,500
Michigan	35,500	....	35,500	37,300
Mississippi	95,025	4,375	99,400	98,950
Montana	24,400	....	24,400	24,500
Nebraska	6,600	....	6,600	6,400
New Mexico	162,825	450	163,275	162,975
Oklahoma	531,300	....	531,300	530,800
Texas	2,795,300	44,825	2,840,125	2,888,175
Dist. 1	33,750	175	33,925	33,950
Dist. 2	157,050	3,700	160,750	164,900
Dist. 3	459,850	25,500	485,350	493,050
Dist. 4	255,950	4,450	260,400	265,750
Dist. 5	58,950	350	59,300	61,300
Dist. 6	119,950	4,400	124,350	125,800
East Texas field	268,125	....	268,125	272,700
Dist. 7-B	89,650	75	89,725	89,600
Dist. 7-C	132,025	5,450	137,475	137,800
Dist. 8	976,600	250	976,850	998,700
Dist. 9	160,600	475	161,075	161,625
Dist. 10	82,800	....	82,800	83,000
Utah	4,100	....	4,100	4,000
Wyoming	194,000	....	194,000	193,000
North Dakota	800	....	800	1,000
Total U. S.	6,231,650	93,275	6,324,925	6,374,275
Change from previous week, down			49,350	
Canada				110,064
Total U. S. production January 1-May 3				785,512,550 bbl.
Same period last year (crude plus cond.)				*745,650,250 bbl.

*Incl. 10,119,650 bbl. condensate.



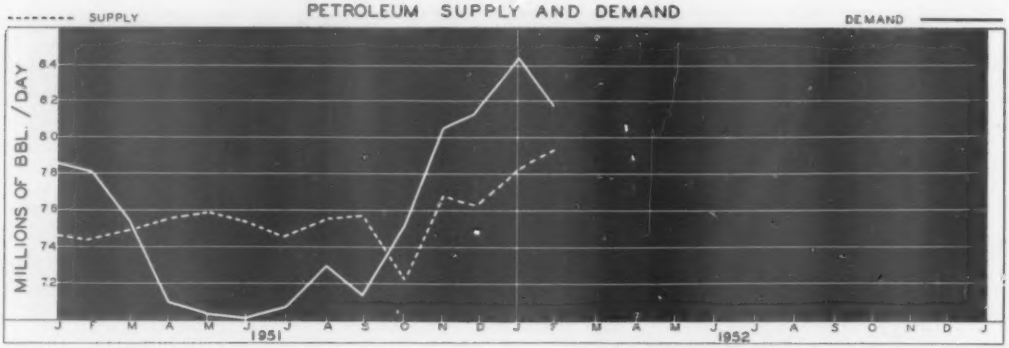


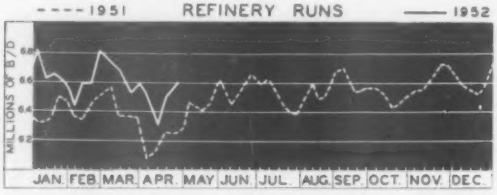
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

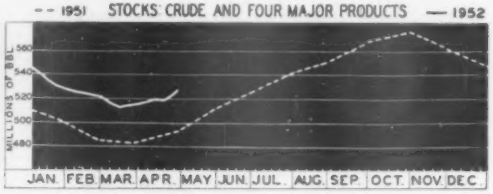
(Thousands of barrels)

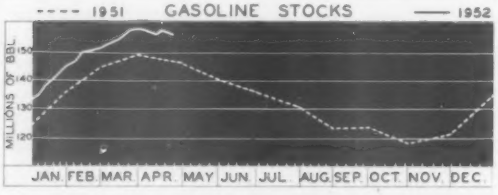
	Apr. 26, '52	Apr. 19, '52	Apr. 28, '51
Pennsylvania Grade	2,371	2,406	2,077
Other Appalachian	2,065	2,446	1,630
Illinois, Indiana, Michigan	11,499	11,208	10,395
Arkansas	3,002	3,043	2,605
Louisiana	14,449	14,002	14,679
North	2,756	2,837	2,988
Gulf	11,693	11,165	11,691
Mississippi	3,526	3,627	3,226
New Mexico	7,228	7,444	6,975
Oklahoma and Kansas	43,072	41,120	37,251
Texas	125,072	124,840	112,437
East Texas proper	11,605	11,403	(†)
West Texas	55,870	55,615	(†)
Texas Gulf	26,766	26,299	(†)
Other Texas	30,831	31,523	(†)
Rocky Mountain	15,077	14,939	13,380
California	30,157	30,445	29,908
Foreign	7,263	7,269	7,916
Total	264,781	262,791	242,479

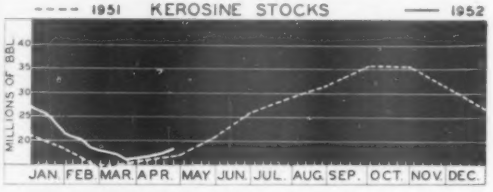
*Bureau of Mines. †Not comparable with current week.

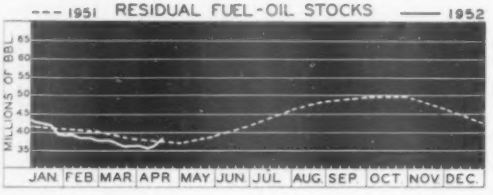












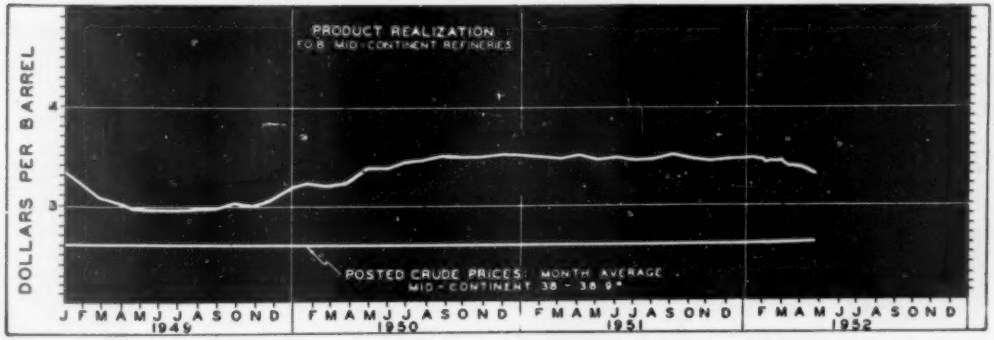
Strikes Delay A.P.I. Refinery Report

DATA on refinery operations and product inventories compiled and released by the American Petroleum Institute are not available for week ended May 3. The Institute said, "Because it has been impossible to obtain accurate and complete information due to strikes at several refineries it has been decided to forego the release of our regular weekly reports of refinery activity and major product inventories until completeness and comparability with previous reports can be reestablished."

Available reports on idle plants indicate that as of May 7 about 35 per cent of total refining capacity in the country was not operating.

For the most part, the strikes have been concentrated in Districts 2 and 3. About 90 per cent of idle capacity is in these two districts. In contrast these districts have only about 65 per cent of total refining capacity in the country. Capacity at struck plants represents better than 50 per cent of total capacity in each of the two districts.

Only about 12 per cent of total capacity is down in District 1. District 4 has a little more than 30 per cent idle. There have been threats of strikes on the West Coast, but workers have been called out at only one plant in Washington.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.29 for week ended April 26, $3.31 for previous week, and $3.51 for April 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 7, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10⅜	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11⅜	13.5-13.75	11¾-12
42-44 w.w. kerosine	8¾-9	10-10.1	9
No. 2 straw fuel oil	7¾-8	9-9.25	8
No. 6 residual	$1.35-1.40	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29
200 vis., No. 3 neutral, 0-10 pp.	16.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

THE only important changes in open-market price quotations resulting from the strikes have been in Mid-Continent and North Central areas. It was in these areas that increased refinery operations had added enough to product stocks to cause soft markets earlier this year.

Even in these areas only gasoline and residual markets have taken on strength because of reduced supplies. Very little increase has been noted in inquiries for kerosine and No. 2 fuel. In a few cases, normal movement of residual fuel to industrial accounts was halted because customers' inventories were in excess of 10 days' supply, the limit established by Petroleum Administration for Defense. The limitation was established first for the East Coast area but was extended to cover all of United States except the Pacific Coast, effective May 6.

Evidence of shortage of gasoline in District 2 despite excess inventories a week earlier has been due to the fact that at least 60 per cent of primary gasoline stocks in the district are at refineries. In District 1 only about 28 per cent of primary gasoline inventories at end of February were in refinery storage. Also, about 53 per cent of capacity in District 2 is idle because of strikes compared with about 36 per cent for the country as a whole. Since 60 per cent of the gasoline in District 2 was at refineries and 53 per cent of the plants closed, about one-third of the gasoline in storage is not available for shipment.

The mad scramble of suppliers to buy gasoline for normal requirements tends to overemphasize the strength of the market, but reports of sales show higher prices on the Group 3 market.

Open-market sales on the East Coast have been restricted by the uncertainty of future price ceilings. Spot sales have been further reduced by the possible product shortage. Tanker rates have dropped slightly since the strikes started.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Marshall Is Made Asst. General Sales Manager

A. S. MARSHALL

H. C. Smith, president of H. C. Smith Oil Tool Co., has announced the appointment of Arthur S. Marshall as assistant general sales manager.

Marshall joined the company in 1936, and the following year was appointed foreman of the heat-treating plant. In 1941 he was made foreman of the welding plant, and in November 1949 he was appointed general service manager of the company.

During the period Marshall was general service manager he spent considerable time in all the major oil fields in the United States and Canada, which gave him a thorough knowledge of nearly all known drilling conditions.

Mission Appoints Hebert To Corpus Christi Area

F. J. HEBERT

W. T. Campbell, executive vice president of Mission Manufacturing Co., has announced the appointment of F. J. (Buddy) Hebert as sales representative in the Corpus Christi, Tex., area.

Prior to joining the Mission organization, Hebert was associated with Wilson Supply Co.

Climax Engine Assets Sold to Eversharp, Inc.

Eversharp, Inc., manufacturer of writing instruments and Schick injector blades and razors, recently purchased the entire assets and business of Climax Engine & Pump Manufacturing Co. of Clinton, Iowa, according to Carl G. Preis, Eversharp president.

Under the trademark "Blue Streak," the Climax company manufactures pumps and engines used in drilling and pumping operations in oil fields, and other industrial operations.

Preis announced that Climax was acquired under Eversharp's policy of diversification, and that it would be operated as an independent division of Eversharp, Inc., with no change in its present personnel.

New Reilly Tar & Chemical Sales Representative Named

Reilly Tar & Chemical Corp., Indianapolis, has announced the appointment of Robert J. La Fortune as representative in the Oklahoma, Arkansas, and Colorado territory for protective coatings, creosote oil, and roofing pitch.

La Fortune is a native and resident of Tulsa. He was trained in petroleum engineering at University of Tulsa, and received a B.S. degree in chemical engineering at Purdue University.

Cameron Entertains Desk & Derrick Club

In late March, Cameron Iron Works sponsored a tour through its building covering 14 acres for 67 members of the Houston Desk and Derrick Club. Among the more interesting things viewed by the women was Cameron's 5,000-ton forge press, which is the largest of its kind in the South. It is large enough to forge a piece of steel weighing as much as a Cadillac, and in a day's time, 50 times this much steel can be forged.

Cameron furnished buses to transport the women from downtown Houston to the plant. A dinner was served to those present, prior to beginning the tour.

Independent Exploration Promotes Dunlap In Canada

Albert D. Dunlap has recently been promoted supervisor of all Canadian operations for Independent Exploration Co., with headquarters in Calgary, Alta., Canada.

Dunlap was first employed by Independent Exploration as a helper in September 1933. He has worked on every job in the seismograph exploration party, and was party chief for some years prior to his recent promotion.

Warthen Is Appointed District Manager of Sales

C. WARTHEN

Charles Warthen has recently been appointed district manager for sales of Atlas Engineering Works representing Beaumont Iron Works drilling and producing equipment for the West Texas area, according to T. L. (Doc) Fontaine, president of Atlas Engineering. Warthen's headquarters will be in Fort Worth.

Warthen has been associated with Atlas Engineering and Beaumont Iron for more than 30 years, during which time he has been active in most departments of the company. His wide experience in the oil-field equipment business will be of practical advantage to Beaumont Iron customers throughout West Texas.

Bethlehem Names Hawkinson To Tulsa Engineering Post

H. L. HAWKINSON

H. L. Hawkinson, Jr., has been appointed assistant chief engineer of Bethlehem Supply Co.'s manufacturing division. Harvey E. Davidson is chief engineer.

Hawkinson has been with Bethlehem since 1940, and after completing the company's loop training course in sales, acted as engineering sales representative at Tulsa until 1942. After lengthy service in World War II, he returned to the company where he served first as engineering sales representative in the West Texas district, and later as local sales representative, specializing in the sale and application of drilling and production machinery in the Houston district, which position he held until his present appointment.

In his new position Hawkinson will be located in Tulsa, and will assist in the development and design of oil-well drilling and production equipment. He will specialize in the application and use of equipment in the field, and in its modification or improvement to keep pace with the needs of the oil industry.

Waltimire Named California Representative for DEMCO

Drilling Equipment Manufacturing Co., of Oklahoma City, has announced the appointment of Ted Waltimire as its representative in the State of California.

Waltimire, prior to having established himself as a manufacturer's agent in 1947, was employed for 20 years by National Supply Co. He served as store manager in several various areas of California during the last 15 years with National.

In addition to the DEMCO line, Waltimire also represents Gearench Manufacturing Co., Johnson Block Co., and Hercules Tool Co.

Western Co. Names Myers, Smith to Executive Posts

J. L. MYERS

J. L. Myers has been named assistant vice president, and Ralph E. Smith has been made manager of the employe-relations department of The Western Co., as announced by John F. Younger, vice president and assistant general manager of the company.

Jack Benefield has joined the staff of Western's employe-relations department as editor of the employe publication, "The Western Brand."

Myers has been with the company for a year and a half and was first a sales representative in the Panhandle-western Kansas area, and in September 1951 was made manager of the employe-relations department in Midland. In his new capacity he will supervise the employe-relations department, serve as secretary to the company's executive committee, and will supervise various management projects.

Smith joined the staff of employe-relations department in November 1951 as training supervisor. As manager of the department he will direct all phases of Western's employe program.

Howard Co. Awarded Brand Name Certificate

The Howard Co., Midland, Tex., has been presented with a certificate of distinction as Brand Name Retailer of the Year in the office equipment and stationery stores classification by Brand Names Foundation, Inc. The foundation is composed of over 700 national advertisers.

According to Ray Howard, owner, the Howard Co. does over 95 per cent of its business with oil companies in the Permian basin. Starting the business with less than $500 capital on his release from the Army in 1947, Howard has built a large printing business, and one of the leading office supply and equipment businesses in the Southwest.

Pressure Services, Inc., Organized In Dallas

W. L. LONG

A new oil-field service company has been organized under the name of Pressure Services, Inc., with headquarters in Dallas. According to W. L. (Luke) Long, executive vice president of the new company, operations will be largely in the Gulf Coast and Mid-Continent fields, but will extend to all other areas in the United States and foreign countries.

Pressure Services, Inc., will specialize in running and pulling pipe under pressure, and will provide technical assistance and service for operators of flowing and pumping dually completed wells. The company will also engage in the development and sales of new equipment required in the oil and gas industry.

TEMPLE HOFFER

R. R. SMITH

Other officers of the company include: Temple Hoffer, president, and Robert R. Smith, secretary-treasurer.

Roebling Co. Erects New Building in Los Angeles

John A. Roebling's Sons Co., Trenton, N. J., recently moved its Los Angeles district office and warehouse into a new, ultramodern building. According to E. C. Low, vice president, sales, the completion of the structure marks the latest step in the company's program of expanding its sales, warehousing and product-assembly facilities. The 44,500 ft. of floor space is laid out to provide offices and modern facilities for quick delivery service and efficient storage. Ample space also is provided for the large equipment used in making wire rope and industrial assemblies, and in transporting heavy reels. Among the executive offices in the structure are those of R. C. Groesbeck, district manager, wire-rope division; J. L. Kelley, Pacific Coast district supervisor, wire and cold rolled products, and G. H. Cederlof, district supervisor for the electrical wire division.

Steinmiller Is Named to Midwestern's Chicago Branch

Continuing its recent program of expansion, Midwestern Engine & Equipment Co., Tulsa, recently announced establishment of new sales representation in Chicago. Fred J. Steinmiller has joined Midwestern at Chicago and will handle the company's pipe-line wrapping and supply items for the Indiana, Illinois, Iowa, Wisconsin, and Minnesota area.

Steinmiller has been engaged in sales and transportation activities in the Chicago area for a number of years.

With the addition of the Chicago branch Midwestern has sales representation in seven primary areas—Houston, Pittsburgh, Atlanta, Shreve-

port, Chicago, Tulsa, and Oklahoma City.

Lincoln Electric Adds To Board of Directors

At a recent meeting of the shareholders of Lincoln Electric Co., J. S. Roscoe and G. E. Tenney were elected as additional members of the board of directors. Board members for the year 1951 were reelected for another year.

Roscoe joined Lincoln in 1924. He was appointed director of purchasing for the company in 1951. He previously was district manager in Chicago, Pittsburgh, and Syracuse.

Tenney, service manager, was district manager in Chicago for 15 years before his appointment as service manager in 1948. He was sales manager for Moore Drop Forging Co. of Springfield, Mass., before joining Lincoln in 1932.

Long Is Appointed an Assistant Vice President

JOHN H. LONG

P. M. Cobb, vice president of sales, Consolidated Western Steel Division of United States Steel Co., has announced the appointment of John H. Long as assistant vice president and manager of sales for the Texas district.

Long joined Consolidated Western in 1944 as a sales representative in its Houston sales office. Prior to that he was for several years a member of the consulting engineering firm of Le Blanc & Long at Beaumont. At the time of his recent promotion, Long was manager of sales for Consolidated Western's Texas district, which covers most of the Southwest area.

Cobb revealed that Kenneth Lieber has been named assistant vice president and manager of pipe-line sales for all districts of the division. Other appointments include J. C. McPherson as assistant vice president and manager of sales for the San Francisco district, and J. G. Thompson as assistant vice president and manager of sales for the Los Angeles district.

Simultaneously, Ralph W. Seely, vice president and assistant to the president of Consolidated Western, announced the appointment of Alex N. Silverstein as assistant vice president, and who will handle customer relations and other management matters. He has been with Consolidated and predecessor companies since 1914.

Lieber is a graduate of Dartmouth College and has been associated with Consolidated Western since 1945. In his new capacity he will be in charge of pipe-line sales.

Twin Disc Holds Open House in New Factory Branch

Twin Disc Clutch Co.'s new office and warehouse at Dallas.

On April 1 Twin Disc Clutch Co. held open house in its new Dallas factory. Participating in the meeting with the many friends and business associates of Twin Disc were the following officers and key personnel from the Racine, Wis., and Rockford, Ill., plants: J. H. Batten, president; N. F. Adamson, vice president of sales; R. G. DeLong, vice president, hydraulic division; G. L. Shuman, vice president, finance and secretary; E. C. Billings, sales manager, Racine; W. B. Gibson, sales manager, Rockford; W. F. Shurts, director of engineering; J. E. Pierson, administrative assistant to general manager's department; C. F. Mohrbacher, assistant sales manager; P. W. Wahler, service manager, and Verl Foss, pilot.

This new office and warehouse has some 10,000 sq. ft. with 8,000 sq. ft. devoted to the stocking of repair parts and services for Twin Disc hydraulic torque converters, friction clutches, power takeoffs, and industrial hydraulic drives. A modern, air conditioned general office covers an additional 2 000 sq. ft.

Baroid Names Stiba to District Sales Post

BEN F. STIBA

Ben F. Stiba has been appointed district sales representative for the Baroid Sales Division, National Lead Co., in the Corpus Christi district, according to George L. Ratcliffe, general manager for Baroid.

A graduate of Southwest Texas State College, Stiba joined Baroid Sales Division in 1948 as a field service engineer in the Gulf Coast division.

Baroid is a leading supplier of drilling-mud products and mud-testing equipment.

Electrical Equipment Contract Awarded to Westinghouse

Westinghouse Electric Corp. has been awarded a $278,000 contract for the major electrical equipment to be used on a petroleum products pipe line now being reconstructed by Tuscarora Oil Co., Ltd., to transport refined oil products across Pennsylvania.

The 12-in. line, capable of carrying 56,000 bbl. of oil per day, will extend from Allentown to the Ohio River. Westinghouse equipment will be used at pumping stations located near Allentown, Harrisburg, and Altoona, Pa. Each station will be equipped with two 600-hp. and one 300-hp. explosionproof motors.

Gray Made District Manager of Great Lakes

W. C. GRAY

W. C. (Dub) Gray has been appointed district manager of Great Lakes Corp., according to an announcement by Robert M. Cook, vice president in charge of sales.

Gray comes to Great Lakes after having held positions as division manager of Security Engineering Co., Inc., in Canada and more recently as division manager of its operations in Oklahoma and Kansas. Prior to his connection with Security Engineering he was associated with Halliburton Oil Well Cementing Co. He will represent Great Lakes in the Oklahoma City area.

Great Lakes Corp. are the distributors of Strata-Crete and Strata-Seal.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 15c a word one issue. 10% Discount three or more consecutive issues. $3.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

FOR SALE: Wilson Giant Draw Works: 2—Buda JL-1335 Motors with chain compound: 2—Cooke Butane Tanks: 4 Sheave National Traveling Block: 1—HP-217 Buda Engine: 5000' 4½" Drill Pipe. All in good drilling condition. Powell Drilling Company, 306 Derby Bldg., Wichita, Kansas.

CATERPILLAR D-13000 Power Unit, open Clutch, Outboard Bearing, Rebuilt, priced right. Martin Tractor Company, Chanute, Kansas. Phone 73.

USED PUMPING UNITS and engines. One Lufkin TC-1A-54B unit with Lufkin Cooper-Bessemer engine and one O.C.S. 40 H. P. Bat unit with Superior GB engine. Both are single reduction units. Located near Kermit, Texas. Cities Service Oil Co. (Penn.), P. O. Box 1117. Crane, Texas.

FOR SALE

3—CT14L 22.5 - hp. Cabot twin - crank, used, pumping units. 54" maximum stroke, complete with U6 International engines.

1—30-hp. Ideco 54"-stroke, single reduction twin crank pumping unit, complete with 503 Fairbanks-Morse engine.

All material in good shape.

OVERTON SUPPLY CO.
Box 545 — Phone 2721
Overton, Texas

PRESSURE VESSELS
Immediately Available

8—10' ID dia. x 40' x 3" shell. Heads 3½". Test Pressure 900 psi. WP 600 psi.

5—10' ID dia. x 40' x 2½" shell. Heads 3". Test Pressure 750 psi. WP 500 psi.

8—8' ID dia. x 40' x 2" shell. Heads 2¼". Test Pressure 750 psi. WP 500 psi.

1—6' ID dia. x 40' x 2" shell. Heads 2¼". Test Pressure 750 psi. WP 500 psi.

All used, good condition, seam to seam, welded code construction. Built by A. O. Smith Corp. Located near Chicago, Ill. Prints, prices available on request.

WIRE—PHONE—WRITE

KINSLOW POWER & EQUIPMENT CO.
817 So. Boulder, Tulsa, Okla.
Phone 5-3914

EQUIPMENT FOR SALE

7500' OF API Full Hole 4½" Drill Pipe. Graded and tested by Sonoscope engineers. Milford Giffin, Giffin Hotel, Tel. 477, Hoisington, Kansas.

FOR SALE: Ft. Worth Jumbo Spudder with or without tools. Good condition, priced to sell. Doak Drilling Company, Box 1108, Bristow, Oklahoma.

for
VALVES • FLANGES • FITTINGS
it's
Newman's Inc.
"One of the Southwest's Leading Distributors"
Tulsa, Okla. P.O. Box 1865 Ph. 25228-LD 635

EQUIPMENT FOR SALE

BUCYRUS-ERIE 36-L Semi-Trailer mounted complete accessories, lines and 8⅝" pipe. Phone 1590, Box 617, Okmulgee, Okla.

FOR SALE at our Oklahoma City Warehouse, Three 9½" x 14" VTH Used Clark Compressor Cylinders from angle compressors. Cities Service Oil Co., Patridge, Bartlesville. Okla.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 122—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
FRACTIONATION COLUMN and ACCESSORIES

Designed and fabricated by Braun to stabilize 6,000 bbls./day 67° API gravity crude.

Design: API-ASME code 200 psi W.P., 400° F., 375 psi Test
Dimensions: 66" x 59', .750" Shell, .750" Semi-Ellip. Heads, 30 trays on 18" spacing. Weight 47,500#
Nozzles: One 6" feed, one 3" reflux, one 8" vapors, one 8" bottom, one 10" vapor-return and two 3" relief-valves.

Heat Exchangers

Braun, horizontal, removable tube bundle, seamless admiralty tubes, cast-semi-steel body.
4—18" ID x 12', 4 pass tubes 250 psi, 2 pass body 200 psi
2—15" ID x 12', 2 pass tubes 100 psi, 2 pass body 200 psi
2—22" ID x 15', 6 pass tubes 100 psi, 2 pass body 200 psi

Reboiler

Braun, kettle type, removable tube bundle, seamless admiralty tubes, steel body, 26" x 48" x 21', 2 pass tubes 300 psi, body 200 psi at 400° F.

Steam Pumps

1—National Transite, Duplex, 8 x 4 x 12
3—National Transite, Duplex, 7½ x 5 x 10
2—Burnham, Simplex, 8 x 7 x 20

Reflux Accumulator 66" x 12'
Piping, Valves and Fittings
Brown Instrument Controls
Located in Wyoming

Drawings and Specifications Available

For further information please contact:

The Ohio Oil Company
P. O. Box 120, Casper, Wyoming

EQUIPMENT FOR SALE

FOR SALE: New Bovaird and Company double eccentric and single eccentric pumping powers at Garnett, Kansas. For price contact A. L. Rhodes, Deep Rock Oil Corporation, Garnett, Kansas, or Joe Huitt, Tulsa.

EQUIPMENT FOR SALE

Franks SAL-5000 rig. 2 NHS Cummins diesel engines. Franks rotary rig 96 feet. Jackknife derrick. Provided with pump drive. Good condition. Ready for immediate delivery. Box E-726, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 6 New 20,000 Gal. Underwriters Steel Storage Tanks, 5/16" plate, welded. 10'6" dia. x 31' long. Located Springfield, Missouri, and Newark, N. J. Owner L. M. Stanhope, Rosemont, Penna.

TWO pipe pulling machines, heavy duty double drum draw works. International Motors, spudding attachments to rip casing pipe break-out and cathead, 53' steel A-masts. Tools, 15 down spiders, tongs, elevators, stems, rippers, bailers. Phones 2-0061, 7-5013, 1323 East 26th Place, Tulsa, Okla.

USED 2" LINE PIPE

We are offering, subject to prior sale, approximately 480,000 feet of 2" 3.75# Line Pipe, located in West Virginia. We are inviting inquiries from dealers, as well as consumers.

Phone 5-9261, Extension 361, or write Box 2171, Tulsa, Oklahoma

FOR SALE

3500' 5½" O.D. 14# No. 1 used Seamless Casing 8rd. R. 2
10,000 tons 5½" 15.5# R. 2 LT&C API seamless Casing, Japanese Manufacture.

FRANK MORRIS & CO.
424 So. Cheyenne, Phone 2-6247 Tulsa, Oklahoma

FOR SALE
OPERATING REFINERY SKIMMING PLANT
ON OHIO RIVER
TROY, INDIANA

Crude presently available. Good markets and personnel. No labor troubles.
Box 535, Evansville, Indiana

TANKS FOR SALE

Good as new, for immediate delivery. One 80,000 BBL. Seven Ring all steel tank for $25,000.00. Three 55,000 BBL. Five Ring all steel tanks for $17,500.00 each. As is where is and subject to prior sale. We will also cut down and re-erect as welded tanks either of the 55,000 BBL. tanks above for $38,500.00. Or we will cut down and re-erect the 80,000 BBL. as a welded tank for $50,250.00. These are rivited tanks and of standard construction and may be inspected now near Shreveport, La. Contact by mail or phone

We will trade any of the above tanks for Scrap iron.

CLYDE DAMPF, INC.
Box 2515, Amarillo, Texas. Phone 3-5050

STEEL STORAGE TANKS

11—55,000 bbl. Tanks—114' 6" dia. x 30' high
10—80,000 bbl. Tanks—117' 6" dia. x 41' high

All tanks steel roof, riveted construction throughout. Standing location near Mexia, Texas, and suitable for re-erection. Detailed specs. and prices available on request.

SOUTHERN IRON & METAL CO.
Box 3270, Beaumont, Texas
MID-STATES PIPE & SUPPLY CO.
Box 2534, Tulsa, Okla.
ROGERS & WRIGHT, INC.
215 Wright Bldg., Tulsa, Okla.
HORWITZ PIPE & STEEL CO.
Box 1406, Oklahoma City, Okla.

EQUIPMENT FOR SALE

FOR SALE: Frederick, Oklahoma, Field—5 Used 122' American Type 66M Angle Iron Derricks, Mild Steel, Cap., 246,000# 6" x 6" x ⅝" Starting, 6" x 6" x ¾" Running legs, with floorable platform, safety top and crown block. Standing. $750.00 Each. Cities Service Oil Co., Patridge, Bartlesville, Okla.

WELL SERVICING UNITS—Skid type, Single Drum Cardwells, Wilsons, Allis-Chalmers, Muskogee, Keltner. Double & Single Pole Mast. Have Draw Works on long skids w/ 86' Double Pole Rotary Mast for shallow well rotary. For sizes & prices—Write General Tool & Supply Co., P. O. Box 4387, Oklahoma City.

FOR SALE: Good 3½" and 4½" OD Drill pipe. Two EKU Waukesha's, One RL Cardwell, Hercules Engine, Tanks, Treaters, Pumping units. Rogers Pipe & Supply Co., 620 Wright Bldg., Tulsa, Oklahoma.

USED well drilling equipment. We buy and sell spudders, rotaries, core drills, tools, pipe, blocks, pump jacks, everything for well drilling and service. All used equipment fully reconditioned. Contact us for your requirements and save money. We rent fishing tools. Pressey & Son, Pueblo Colo.

FOR SALE: 20 pressure tanks 8' diameter X 16' high ⅜'s welded and riveted construction—with mounted feet on sides. Top and bottom equipped with gasket pressure-type heads. 20 units available each $450.00 f.o.b. western Pennsylvania. Box E-737, The Oil and Gas Journal, Tulsa, Oklahoma.

USED rotary and cable tool drilling tools. E. A. Kelly, Box 861, Oklahoma City. Phone 5-4407.

FOR SALE at Oklahoma City Garage: 1 Used 1937 Model Allis-Chalmers Model UE Tractor Well Servicing Unit, with large single drum, gas-gasoline carburetor, drum divider, 11.25 x 24 and 9.00 x 15 balloon tires. Serial No. UET380, Engine No. 47864. No mast. Ready to go. $1500.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: 3000' of 3½" modified drill pipe, Wichtex Draw Works, 65' mast, 17" Oil Well Rotary table, C-100 Ideal 6¼" X 10" mud pump with motor, PA-100 International Draw Works motor, GMC truck 2½ ton tandem, Ford truck 1½ ton, oil field beds and winches. Have all necessary equip. for complete rig. Trade for production. Cash Price $27,500.00. Box 583, Ardmore, Oklahoma. Phone 4726.

FOR SALE: 4—8¾" Orbit 1000# test 8 thread drilling valves. 41—5½" Ditto. All used but in good condition. Michigan Gas Storage Co., 212 W. Michigan Ave., Jackson, Michigan.

FOR SALE: Westcott, Foxboro and Emco Gas Meters. George R. Milner, Box 134, Okmulgee, Oklahoma.

FOR SALE: Well Drilling Business—71 Star, Modernized #3 Keystone, Both Truck Mounted. Complete Tools, 4 to 20 inch. Physical Inventory $15,000. Nets $8,000 to $8,000 yearly. This is Industrial—No Pipe Worries. Sales Price: $11,000.00. Owner retiring. Write Box E-594, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Wilson Super Winch, Waukesha power, 8" x 7" pole, mounted on Ford truck, complete set rod and tubing tools. Cleaveland Well Service, P.O. Box 308, Tel. 446, Luling, Texas.

2200 ft.—7"—24# Seamless good used Casing—$1.95 ft. Jay Kornfeld, 1121 Union National Bank Bldg., Wichita 2, Kansas. Phone: 4-2121.

FORT WORTH Model-D Spudder complete with International Power Unit, tools for 22" diameter holes, $4,500.00. Located near Los Alamos, New Mexico. Inventory furnished upon request. Texas Water Wells, Inc., 951 McCarty Drive, Houston, Texas.

FOR SALE: Cardwell Model R. Double Drum Draw Works powered by Hercules 174 H.P. Engine, completely overhauled, A-1 condition. Cooper, Model 678 E T Tractor type Pulling Unit, 60 Ft. telescoping Mast. H. F. Ryan, 809 First National Bldg., Tulsa 3, Oklahoma.

FOR SALE: Mayhew 2000 Core Drill with 145 HP Ford auxiliary motor, mounted on 6 x 6 G.M.C. truck, practically new, A1 condition. Lewis and Clemens Drilling Co., Princeton, Ind. Phone 706.

EQUIPMENT FOR SALE

FOR SALE F.O.B. Pittsburgh, Pa.: Ten No. 1-2 Toby Gas meters, rated at three hundred feet an hour, all in No. 1 good condition. Wm. E. Stier, 153 Hinkel Road, Pittsburgh 29, Pa.

FOR SALE: One Model 36-L, Bucyrus-Erie, Type EB Spudder. Equipped with Buda L.O. 525 gas-gasoline engine, casing tackle strut, tool crane, cables, light plant, water tank, and complete tools for 12", 10", 8", and 6" hole. Price F.O.B. Princeton, Indiana and subject to prior sale $18,000.00. Randall-Zogg Supply Company, P.O. Box 3, Princeton, Indiana. Phone 802 or 219.

FOR SALE: One completely rebuilt, model 24-L Type EB, Bucyrus-Erie Spudder. Equipped with Buda H.P. 336 engine, 40' telescopic derrick, power derrick hoist, swabbing unit, catheads, and casing reel. Price F.O.B. Princeton, Indiana, and subject to prior sales $6,500.00. Randall-Zogg Supply Company, P.O. Box 3, Princeton, Indiana. Phones 802 or 219.

7200'—3½" 13.30# External upset Drill Pipe with I. F. Tool Joints. Good for shallow drilling. Per Ft. $1.00. Three B. Oil Co., P. O. Box 4671, Tel. ME 2-1644, Oklahoma City, Okla.

FOR SALE: 12" x 8¾ x 16" Gumbo Buster Steam Pumps (2) in excellent condition with all fittings, a complete set up, for pumping water, Oil etc. Also 2000' of 10¾" and 6⅝" O.D. line pipe. This plant recently closed down. Located Lake Charles, La. Contact owner, A. A. Gilbert Pipe & Supply Co., Shreveport, La. P.O. Box 986.

PIPE

All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co. Phone 45970. P.O. Box 151, Tulsa, Oklahoma.

FOR SALE: 96 4" Kerotest Type J Steel Flow Line Gate Valves, Screwed, 4000# test. New, not used. Regular price $249.00, specially priced at $159.36, subject to prior sale. Located in Oklahoma City. F.O.B. your domestic location on quantities of two or more. Cash or credit subject to approval. Box E-733, The Oil and Gas Journal, Tulsa, Okla.

For Sale

DOUGLAS DC-3

(CONVERTED C-47)

CUSTOM Executive Interior — DIVANS — Private Compartment

Total Hours to February 21, 1952

Airframe	2665
R/H Engine	585
L/H Engine	352

P&W R1830-92 Engines
6477A-0 (Paddle) Propellers

RADIO EQUIPMENT: 2 Bendix MN62 ADFs, 1 each: Bendix RA10 Range Receiver, Bendix MN53 Marker Receiver, RTA1B 50-watt MF Transceiver, ARC 3 VHF Transceiver, ARC Tunable VHF Receiver, Collins 17L Transmitter, Collins 51R2 Omni & Localizer Receiver, Collins 51V Glideslope Receiver.

INCLUDED SPARES: R1830-92 Engine, 6477A-0 Propeller, Miscellaneous Accessories, and Instruments.

For Information, Write

Box E-700
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT FOR SALE

82 NEW 9⅝" OD 8 Rnd Short Thd H-40 couplings at 21.26 ea. 77 New ditto J-55 at 21.26 ea. 24 New ditto Long thd N-80 at 52.28 ea. Reply: Box 9877, Fort Worth, Texas.

FOR SALE: 43-Star Spudder Special, Caterpillar mounted. Powered 4600 Caterpillar Diesel Engine. Tools 10 in. to 5 in. 4 Stems, 1500 ft. Drilling line, ⅞, 1500 ft. Sand line, ½ in. Lines drilled one 900-ft. well. Shear poles, doghouse and all other equipment necessary to drill. Schofges & Kimsey, Colony, Kans. Phone 48, Box 204

10,000' OF 6" 52# per ft. 12' lgths Bell & Spigot Cast Iron Pipe #1 Used. FOB Illinois $1.25 per ft. 1—5" x 6" 16 Stage Turbine Pump with 10 HP 3 PHS F & M Electric Motor. Deliver 13,000 Gal Per Hour against 140 Ft Head, FOB Ill. $1175.00. 1—4" Centrifugal, American Service pump with 30 HP 3 PHS Wagner Electric Motor. Deliver 600 Gal per Minute against a 100' head, FOB Ill. $950.00. Several smaller pumps and motors too numerous to mention. All subject to prior sale. Used in A1 condition. L. M. Koger, 1115 E. 2nd St., Centralia, Ill.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

1,400 FEET or less 3½" EUE or 2⅞" EUE drill pipe, new or good used. One 30 foot 4¾" drill collar, new or good used. Have PAD authorization for pipe. Box E-606, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

USED: 1—13⅜" BJ Spider. 1—13⅜" BJ Elevator. 1—10¾" BJ Elevator, with or without slips. Box 251, Dove Creek, Colorado.

WILL TRADE—600 joints of second-hand lapweld tubing at Garnett, Kansas, for 4½" line pipe. Contact Huitt, Deep Rock Oil Corp., Tulsa, Oklahoma.

WILL TRADE—6500' of 9⅝" 43.5# N-80 casing at Odessa, Texas, for 5½" casing. Contact Huitt, Deep Rock Oil Corp., Tulsa, Oklahoma.

LOSS CORPORATION

Want drilling or oil producting corporation showing operating loss over $25,000; will pay cash. Airmail or wire details to

NORMAN D. FITZGERALD
1141 Butternut Street, Abilene, Texas

WANTED FOR CASH

Electric Motors
Motor Starters
Oil and Air Breakers
Wire—Cable—Switches—Fittings
We Buy Oil Well

ALLIED ELECTRIC & MACHINERY CO.
1007 Falls Bldg., P.O. Box 1838
Memphis 1, Tenn.

HELP WANTED

CONSTRUCTION FOREMAN: Excellent opportunity for a competent man with experience in refinery construction and maintenance, preferably in Fluid Catalytic Cracking Plant. Write Northwestern Refining Co., P.O. Box 348, St. Paul Park, Minnesota.

PETROLEUM GEOLOGIST, ENGINEER. splendid opportunity to start now and grow with new venture in Rocky Mountain oil development. Prefer married man who would make headquarters in Denver, Colorado. Only occasional trips out of town will be necessary. Write giving qualifications and experience. Box E-755, The Oil and Gas Journal, Tulsa, Oklahoma.

RAPIDLY expanding Company wants College graduate for Oil Country sales job. Must be between 27 & 35 years of age. Write stating qualifications and present position. All replies confidential. Box E-735, The Oil and Gas Journal, Tulsa, Oklahoma.

NOW READY: List showing where to apply for foreign oil jobs. Write for price. OIML Co., Box 2603, Tulsa, Okla.

VICE PRESIDENT, MARKETING. 50-56. Successful record in petroleum products. $25,000 - 30,000 Salary. Submit confidential record to Tomsett Associates, Executive Personnel Counselors. 331 Frick Building, Pittsburgh 19, Pa.

WANTED: Experienced Reservoir Engineer by Independent Consulting Firm. In applying please state detailed experience and salary expected. Interest participation if qualified. Abilene Sample Log Service, Box 1939, Abilene, Texas.

RESERVIOR ENGINEERS

Major Oil Company has openings in Venezuela for qualified Reservoir Engineers. Age 26-40, B.S. in Petroleum Engineering or equivalent. 5-7 years' exp.

Write giving full details to:

P. O. Box 35

Bowling Green Sta., N. Y. 4, N. Y.

Scheduling Engineer

Major petroleum refinery construction company located in New York has excellent opportunity for outstanding Scheduling Engineer with minimum 3-5 years' experience in job scheduling on petroleum or chemical plants: starting with engineering and proceeding through procurement and construction. Please submit complete resume, including past earnings record. Your reply is confidential. Our employes know of this ad.

Box E-729
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL for LARGE INTERNATIONAL OIL COMPANY

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-667, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

RESERVOIR ENGINEER with over 5 years' experience, including field training. Independent California operator. Box E-748, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-616, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Combination Safety Engineer and Metal Inspector. Southwest Refinery. Box E-681, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Seismograph party chief. Interested in profit sharing with small organization. Box E-751, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR ENGINEERS

Major oil company with extensive operations in the Middle East has openings in its New York office for qualified Petroleum or Reservoir Engineers, proficient in mathematics, and with extensive experience in oil and gas reservoir engineering on primary and secondary recovery problems. Salary: Open.

Send complete resume to:

Box E-753

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

MUD TECHNICIANS

Major oil company in Venezuela has openings for experienced mud technicians. Age 25-40; 2 years college and specialized training. 1-3 years' experience. Approximate annual earnings $8330.

Write giving full details to:

GULF OIL CORP.
Foreign Prod. Div.
P.O. Box No. 35, New York 4, N. Y.

WANTED ENGINEERS

WITH GOOD JOBS WHO WANT BETTER JOBS

Men with 2 to 5 years 'experience in petroleum, geological, chemical, mechanical, electrical engineering fields wanted by progressive oil and gas well service company to train for responsible positions in acidizing, perforating, fracturing, logging service. Training program begins immediately, last 4 to 12 months, depending upon previous experience of individual. Salary while training $450 to $600 a month, based on experience, qualifications and ability. Company now operating in West Texas, New Mexico, Oklahoma, Kansas; expanding immediaely into Rocky Mountain area. Advancement fast for those with ability. Write today giving experience, scholastic record, present employer, references and reasons for desiring change. Enclose photograph. Write to:

Box E-744

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Building, Tulsa, Okla., 4-5974, Tom Robinson, owner. For technically trained personnel. No Fees. Confidential. Needed now. Landmen with law degrees under 3 years experience. Geologist sufficient experience to head Geological Department. Substantial Independent. Experienced Petroleum Engineers. Excellent Employer.

WANTED: Experienced Fluid Catalytic Cracking Operator to become supervisor of Cat Cracking and to assist superintendent. Location New Orleans. Technical man preferred. Give education, past employment and salary expected. Box E-754, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED engineer capable of designing and servicing Wellhead equipment such as separators, treaters, heaters and attendant equipment handling crude oil to storage. Location Tulsa area with progressive steel plate fabricator. Box E-752, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

EXPERIENCED oil field mechanic, gas, butane and Diesel engines, good references. Box E-734, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 131, Hobbs, New Mexico.

REFINERY Superintendent, experienced 5,000 to 10,000 bbl. plants, desires connection with independent refinery. Box E-696, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: I would like to contact Independents, Individuals and Small Groups in the Tri-State area of the Illinois Basin who desire supervision and management of their Drilling, Completion and Production problems on a contract basis. Thoroughly experienced in this area. Recommendations furnished on request. Box E-738, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Engineer, Master's degree, desires supervisory position with independent refiner or related industry, over ten years' experience in refining and natural gasoline field. Age 36. Box E-732, The Oil and Gas Journal, Tulsa, Okla.

VALUATION Engineer, 29, married, 5 years Major Company. Experienced Mid-Cont., Gulf Coast, Rocky Mt. & Canada, estimating oil & gas reserves and evaluating properties. Electric Log Specialist. Investment Co., Trust or Bank position desired. Box E-761, The Oil and Gas Journal, Tulsa, Oklahoma.

AGE 38, seventeen years' experience with major, independent, and drilling contractor as Petroleum Engineer, production superintendent, drilling superintendent, and general manager. Exceptional experience and acquaintance. Presently engaged in consulting work. Excellent references. Box E-753, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Production Engineer with 15 yrs. experience in drilling, completion, work-over, production work and supervision of production and engineering departments. Presently employed, desires change to a progressive company with future. Reply Box E-756, The Oil and Gas Journal, Tulsa, Okla.

LEASE & TITLE MAN OIL PROMOTIONS & FINANCING WORK. University Graduate: LLB Degree, experience includes all phases lease and title work, financing promotions, development and management. U. S. & South American Oil Fields. Speak Spanish. Desire connection with aggressive independent company. Box E-745, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM ENGINEER: 8 years varied drilling, completion, production, and work-over experience, desires responsible production or engineering position. Box E-758, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST. Geologic degree, fifteen years' geophysical experience with major company, desires supervisory position Rocky Mountain or Mid-West area. Box E-757, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SUPERINTENDENT desires connection with progressive independent. Experienced in Oil and Gas production and drilling. Petroleum Engineering degree. Box E-740, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT, general field operations available at once. Age 48, experience 20 years. Morals and ability unquestionable. Recently resigned former position. References. P. O. Box 1069, Houston 1, Texas.

LEASE AND DRILLING BLOCKS

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

WANTED: Some interested party to give us an 8,000 foot test well in the future oil fields of the states of Oregon and Washington. Leases and drilling blocks now ready. A. H. Groneman, 5029 N.E. 13th, Portland 11, Oregon.

WILL Sacrifice some of my Royalty for quick cash. Proven Production in Arkansas City Field. Section 5 Township 35 Range 4. Dave Berggren, Owner, 201½ So. Sum., Arkansas City, Kans. Pho. 2585 or J. L. Fowler, Enid, Okla. 810 W. Iowa Pho. 4769W.

ENORMOUS flows of gas in Culberson County, Texas, indicate similar deposits of oil close-by, possibly the coming hot spot in the Nation. I can furnish 10-year leases on 1 to 50 sections at market prices which are sure to advance rapidly. E. L. Stratton, Pecos, Texas.

PROFIT participation offered to party submitting acceptable deal with shallow possibilities suitable for secondary recovery. Informant's name treated confidentially if desired. Contact SITCO, 801 Dallas National Bank Bldg., Dallas, Texas.

TWO Drilling Blocks 15,000 acres each on gravity and magnetometer surveyed highs located in South Georgia, open for drilling contract on farm-out or acreage to financially interested parties. Its a good gamble for **surplus tax money.** Tuscaloosa Sand has been drilled with good oil showing at 3,000 ft. in Georgia. If you are ready for a deal this is a good bet for shallow production. T. R. Davis, 700 Mosley Street, Vidalia, Georgia.

SKIRTING production north we are offering 10,000 choice acres in Cimarron County, Oklahoma, at a fair price. Box 1106, Amarillo, Texas.

TEXAS

Writer owns leases upon geophysics high, surrounded by Major Company, Need financial assistance to develop same. Thirty years experience in oil, fields, four possible pays to forty six hundred feet. No promotion, good place for Tax money, references exchanged upon request. **Box E-760, The Oil and Gas Journal, Tulsa, Oklahoma.**

PRODUCTION FOR SALE

We have several producing oil leases for sale in West Texas, on which there are many proven locations. Will furnish details to qualified buyers only—no brokers or promoters.

Box E-713
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

PRODUCTION WANTED

Principals want to purchase production in Kansas, Oklahoma and Texas or corporate control of producing company operating those states. Inquiries invited from owners or responsible representatives.

Box E-731
The Oil and Gas Journal
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

WE invite inquiries from persons interested in Oil and Gas Leases in Southern Alberta, North Central Montana and the Williston Basin. Box E-664, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR LEASE: 3500 acres oil and gas land in Corbin, Sweetwater and Fremont Counties, Wyoming. Will sell equity. Write Joseph L. Lincecum, 817 W. Pine, Rawlins, Wyoming.

NOTICE Capitol Investors: One oil property in the State of Texas. Price $200,000.00. Pays about $60,000.00 per year. Charlie Priolo, 2301 West 6th, Amarillo, Texas.

TWO LOTS north outskirts Snyder; two north outskirts Oklahoma City; one each Stanton, Latt, Quanah, Texas. Want drilling. V. A. Epps, Pioneer Hotel, Tucson, Arizona.

OIL AND GAS LEASES FOR SALE

The following State and Federal leases for sale on a bonus and over-riding royalty basis:

Rio Arriba Co., New Mexico:
SW¼ of NE¼ of Sec. 36 T32N R1W

San Juan Co., New Mexico:
NW¼ of SE¼ of Sec. 2 T11N R10W
NW¼ of NW¼ of Sec. 12 T11N R11W
NW¼ of NE¼ of Sec. 2 T30N R14W
S½ of Sec. 11 T24N R12W

DR. R. LUCIAN HAMILTON
1212 F St. Marysville, California

NORTH DAKOTA
LEASES and MINERALS

Our latest lists with prices mailed on request. We solicit only those connected with the Oil Industry, or Royalty business. References exchanged.

JOHN ALLEN
200 Grand Pacific Hotel Phone 3830
Bismarck, North Dakota

GET IN ON A "MAJOR" PLAY!

Major Oil Companies and a large number of progressive independents are making a great lease play in certain areas of Western Kansas, and we have some well located leases and royalties right in with and under the big company spreads. Here is the small man's chance to be in on the ground floor of a 'big company' play. Write us for full details.

ACACIA OIL & ROYALTY CO.
P. O. Box 881
Tulsa, Oklahoma

BUSINESS OPPORTUNITIES

COMPANY with new warehouse and office facilities in Odessa and well established with Permian Basin Drilling and Production Accounts desires to represent manufacturer of production or drilling specialities. A more complete description of company's facilities and sales potential can be obtained by writing Box 2466, Odessa, Texas.

WANTED TO BUY—A SERVICE ORGANIZATION—Small or Medium. We want to buy a going business—dead or alive, with good personnel. Will consider any line—Drilling, Work-over, Cementing, Testing, Logging, Trucking, Pipe & Supply Yard. What do you have? For cash and quick decision, contact: Melvin W. Jackson, 2523 McKinney Ave., Dallas, Texas.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, Oklahoma.

ROYALTIES

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1228, Great Falls, Montana.

REAL ESTATE

FOR RENT: Ideal Building with Apartment for Oil Field Supply. Good field. Little competition. Best location. R. H. Morey, Virgil, Kans. Phone 501.

FOR SALE MAPS

WILLISTON BASIN WILDCAT MAP
Complete Coverage—U. S. and Canada. Keeps you up to date on all Wildcat Operations. Current—revised every 60 days. $3.50 per copy—Scale 1" = 96,000'. Overall dimensions of map 25½" x 27½".
MIDLAND MAP CO.
Box 1211, Midland, Texas

WILLISTON BASIN MAPS
JUST COMPLETED
COVERING: North Dakota, South Dakota, East Montana, Northeast Wyoming.
SHOWING: Structures, Township and Range, County Outline, County Seats. All wells drilled or drilling. Total depths, Completion Dates, Operators' names. Size 42" x 54"
Price $8.00 Paper, Linen $17.50
Individual County Ownership and Lease Maps
(Twenty-three county maps in stages of completion in the Basin.)
Scale: 1 inch equals 4,000 feet
Published and for sale by
NORTHWEST MAPPING CO.
117½ Fourth Street Phone 3657
Bismarck, North Dakota

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that 60 acres of acquired land of the United States in T. 11 N., R. 15 W., Michigan Meridian, Michigan, within the known geologic structure of the Cedar Creek gas field, undefined, will be offered for oil and gas leasing, through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, June 4, 1952, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that two tracts of land totaling approximately 160 acres in T. 37 N., R. 4 E., P.M., Montana, within the known geologic structure of the Whitlash field, will be offered for oil and gas leasing, through competitive bidding to the qualified bidders of the highest cash amounts per acre, at 1 p. m., Eastern Standard Time, May 21, 1952, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Land and Survey Office at Billings, Montana, or to this office. Marion Clawson, Director.

LEGAL

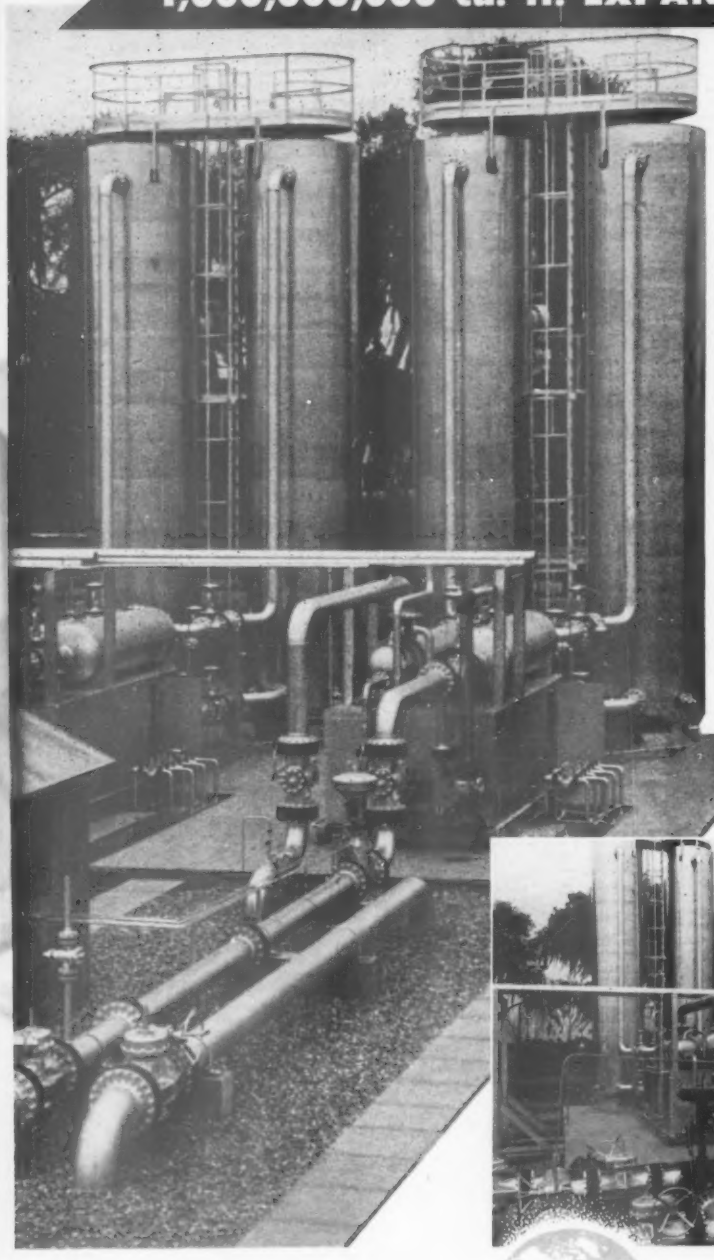
U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that lot 17, sec. 20, T. 10 N., R. 11 W., St. Shephens Meridian, Mississippi, 6.34 acres, within the known geologic structure of the Sharon field, undefined, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, on May 28, 1952, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

ADVERTISERS

Ajax Iron Works 55
Alten Foundry & Machine Works 218
Aluminum Co. of America 150
American Hoist and Derrick Company 223
American Iron & Machine Works Co. Back Cover
American Locomotive Company 227
Anchor Petroleum Company 80
Armstrong Machine Works 56, 57
Associated Oil Field Rentals, Inc. 215
B and W, Incorporated 155
Baird Mfg. Co. 220
Baker Oil Tools, Inc. 82
Beaumont Iron Works Co. 29
Beech Aircraft Corp. 5
Bendix Aviation Corporation 71
Bethlehem Steel Co. 1
Billings Commercial Club 212
Black, Sivalls & Bryson, Inc. 207
Bokum Tool Co. 182
Braden Steel Corporation 151
Burgess Manning Company 60
Byron Jackson Co. 222
Cameron Iron Works, Inc. 76, 77
Century Electric Company 53
Chicago & Southern Air Lines 182
Chicago Bridge & Iron Company Inside Front Cover
Classified Advertising 243, 244, 245, 246
Claymont Steel Corporation, Subsidiary of the Colorado Fuel and Iron Corporation 137
Consolidated Engineering Corporation 198
Continental Oil Co. 38
Cooper-Bessemer Corp., The 118, 119
Crane Co. 7
Crose Manufacturing Co., Inc., M. J. 169
Cummins Engine Co., Inc. 48
Darling Valve and Mfg. Co. 208
Day Company, S. D. 199
Dean Brothers Pumps, Inc. 209
Dearborn Chemical Co. 101
De Laval Steam Turbine Co. 66
Drilling & Service, Inc. 234
du Pont 16, 17, 44
E-I-M Company 131
Eastman Oilwell Survey Company 65
Electric Machinery Mfg. Company 147
Elliott Company 138
Empire Trust Company 220
Emsco Derrick & Equipment Co. 33
Ensign Carburetor Company 67
Erie Bolt & Nut Co. 73
Ethyl Corporation 51, 52
Federal Telephone and Radio Corporation 186
Fisher Governor Company 45
Flint Steel Corporation 206
Floridin Company 152
Fluor Corporation, Ltd., The 180
Foxboro Company, The 36
General Electric Company 10, 11
General Gas Corporation 231
General Manufacturing, The 173
Geograph Company, Inc., The 204
Goodrich Company, B. F. 3
Grancell, I. H. 203
Graver Construction Co. 43
Guiberson Corporation 2
H & L Tooth Company 177
Halliburton Oil Well Cementing Co. 19, 24
Hewitt Rubber Division, Hewitt-Robins, Incorporated 205
Hilliard Corporation, The 209
Houston Contracting Company 201
Hughes Tool Co. Front Cover
Hy-Test Safety Shoes, Division of International Shoe Company 41
Industrial X-Ray Engineers 146
Inferno Co., The 204, 223
Interstate Bedding Co. 209
Interstate Electric Company 129
Kelley Company, Ben F. 230
Kellogg Co., The M. W. 34, 35
Kidder, Peabody & Co. 221
King Tool Company, Ltd. 128
Kinzbach Tool Co., Inc. 233
Klein & Sons, Mathias 205
Koppers Company, Inc. 64
Lane-Wells Company 202
Layne & Bowler, Inc. 133
Lehmann Machine Company 54
LeRoi Company 30, 31
LeTourneau, Inc., R. G. 8, 9
Linde Air Products Company, A Division of Union Carbide and Carbon Corp. 25
Louisiana Paper Company, Ltd. 120
Magnet Cove Barium Corp. 225
Maintenance Engineering Corp. 211
Manning, Maxwell & Moore, Inc. 47
Martin-Decker Corp. 12
Martin Manufacturer, John N. 204
Matthews & Kenan 150
Mason-Neilan Regulator Co. 26, 27
Metallic Building Company 130
Minneapolis-Honeywell Regulator Co., Industrial Division 99
Minneapolis-Moline 22
Minnesota Mining & Mfg. Co. 235
Mission Mfg. Company 74, 75
Mixing Equipment Co., Inc. 184
Modern Engineering Co., Inc. 182
Moon Brothers, Ltd. 221
Motorola, Inc. 107
Murphy Diesel Company 6
National Airoil Burner Co., The 206
National Aluminate Corp. 95
National Bank of Tulsa 70
National Tank Company 248
Nicolet Industries, Inc. 180
Norris Brothers, Inc. 200
Norris Manufacturer, Inc., W. C. 78
Oil and Gas Journal, The 208, 233
Oil Base, Inc. 40
Oil Center Tool Co. 14, 15
Oil Well Mfg. Corp. 228
Oil Well Supply Co. 4
Oklahoma Contracting Co. 200
Oklahoma Natural Gas Company 197
Otis Pressure Control, Inc. 231
Owens-Illinois Glass Co., Kaylo Division 37
Peerless Pump Division of Food Machinery & Chemical Corporation 59
Peerless Supply Co., Inc. 145
Perrault Brothers 199, 223
Petroleum Electric Power Assn. 31
Petroleum Rectifying Company 32
Pipe Line Service Corp. 149
Pittsburgh Coke & Chemical Co. 28
Preco Incorporated 229
Raybestos-Manhattan, Inc. 50
Reading-Pratt & Cady Division of American Chain & Cable Co. 30
Reed Roller Bit Company 232
Republic Steel Corporation 49
Rinehart & Company, Inc. 23
River Construction Corporation 125
Rockwell Manufacturing Company 42
Ross Heater & Mfg. Co., Inc. 16
Ross-Martin Co. 190
Rosson-Richards Company 141
Schlumberger Well Surveying Corp. 69
Second National Bank of Houston 97
Seismograph Service Corp. 102
Shamrock Hotel, The 201
Shell Oil Company 33
Skinner Company, M. B. 165
Smith Corporation, A. O. 123
Southern Engine & Pump Company 148
Southern Mill & Mfg. Co. 216
Standard Oil Co. of California 46
Standco Brake Lining Co. 203
Starrett Company, The L. S. 223
Stearns Company, The D. E. 127
Steel Forgings, Inc. 200
Superior Iron Works & Supply Co., Inc. 134
Tapecoat Company, The 72
Taylor Forge & Pipe Works 192
Technical Oil Tool Corp., Ltd. 188
Tennessee Eastman Company, Division of Eastman Kodak Company 68
Texas-Louisiana-M-K 126
Thornhill-Craver Co. 13
Tipton, J. J. 173
Tulsa Crating Co. 201
Turner Uni-Drive Company 230
Underwood Corporation 220
Union Carbide and Carbon Corporation, Linde Air Products Company 25
United States Rubber Company 61
U. S. Steel Corp., Subsidiaries 4
United Supply & Manufacturing Co. 219
Vernon Tool Co., Ltd. 190
Viking Pump Co. 217
Warner Lewis Company 200
Western Central Petroleums, Inc. 203
Western Pipe Line Constructors, Inc. 143
Wheatley Company, Charles 226
Wheatley Pump & Valves, Frank 161
Willys-Overland Motor, Inc. 20
Wilson Manufacturing Co., Inc. 214
Wood's Sons Co., T. B. 201
Worthington Pump & Machinery Corp. 39, 62, 63
Yale Machine Works 153
Youngstown Sheet and Tube Company Inside Back Cover

TABLE OF CONTENTS ON PAGE 81

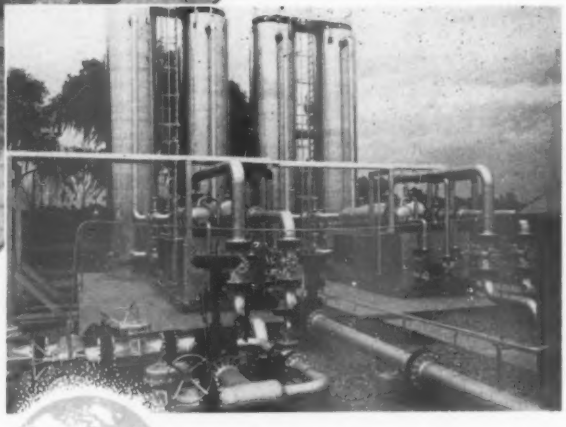
1,000,000,000 cu. ft. EXPANSION PROGRAM



For World's Largest Handler of Natural Gas

To help boost their gas delivery to near 4,000,000,000 cu. ft. per day, this company is installing National Dehydration Units at all of its ten new plants this year. These gas Dehydration Units provide an important phase of processing necessary for efficient delivery of gas from producing area to consumer market.

2 — 55 M²CFD National Dehydration Units



It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

3-5-52

REGISTER and VOTE — it's YOUR country

Gold Depository in Fort Knox, Kentucky

. . . more important than gold!

The most important metal today is not the tons of gold buried at Ft. Knox!

Far more important are the millions of tons of iron and steel scrap so desperately needed to make new steel. All scrap, actual and potential, needs to be gathered up and channeled to the steel producing plants-NOW, today, tomorrow and tomorrow. So long as the steel industry is called upon to produce two million and more tons of ingot steel per week, it must have one million and more tons of scrap each week.

Steel producers are getting the iron ore, limestone and coal they need. But the scrap situation is critical and will continue to be so until inventories are built up substantially.

As a user of steel--as one interested in seeing that America's rearmament program is not too little and too late--you can do your part to see that your community and your business keep scrap moving toward the mills.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

The Youngstown Sheet and Tube Company

General Offices -- Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

In many areas-
a key to GREATER PROFITS!
AMERICAN IRON
Flash Welded
TOOL JOINTS
In many areas — a flash welded, unitized drill string provides advantages that make for greater profits! In these areas, you'll find that American Iron "Flash Welded" Tool Joints provide the key to the most effective, economical performance from this type drill string!
Three important factors make American Iron "Flash Welded" Tool Joints outstandingly dependable. They're DESIGNED RIGHT . . . MADE RIGHT . . . and INSTALLED RIGHT, with gigantic controlled surges of electricity welding tool joints to drill pipe — forming integral units!
Manufacturers of A.P.I., "Straight Grip," "Amweld," and Tubing Tool Joints
AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF
A
OIL FIELD EQUIPMENT
REG. U.S. PAT. OFF.
OKLAHOMA CITY U.S.A.
PETROLEUM EQUIPMENT SUPPLIERS
MEMBER
ASSOCIATION